Rock Products

Volume XXVII | Chicago, May 17, 1924 | Number 10

World's Record Quarry Blast!

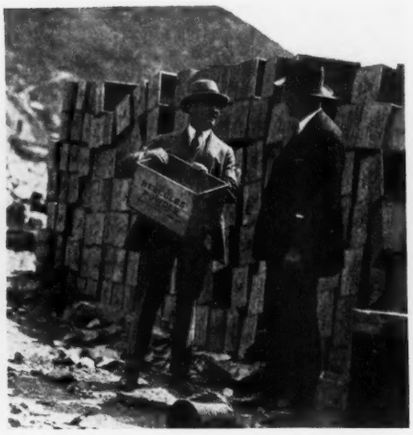
Blue Diamond Company, Los Angeles, Shoots Down 2,000,000 Tons of Rock with 182 Tons of Explosives

WHEN they do things in Los Angeles, they never do them by halves. They also know the value of publicity and they lose no occasion to take advantage of it. So when the Blue Diamond Co. of Los Angeles blasted down a year or two's supply of rock for its Corona crushing plant, it was an event of such importance that no less than 15,000 people, 28 motion-picture outfits and scientists from Washington, D. C., were present as spectators and scientific observers. The story of the blast was a "first page" feature in the Los Angeles newspapers.

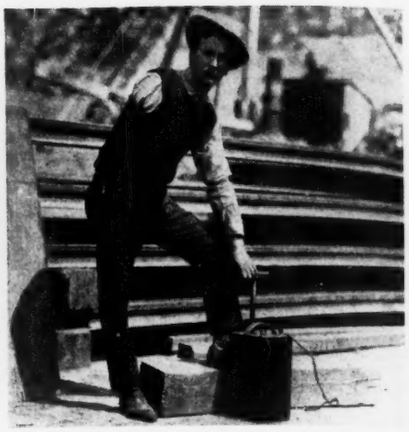
K. M. Grier, of the Blue Diamond Co., who will be remembered by the quarry men who attended the St. Louis convention of the National Crushed Stone Association last January as a prince of entertainers, writes:

"Doing her stuff with a thunderous growl," says K. M. Grier, master of ceremonies at the Blue Diamond Co.'s record blast

One of the tunnels



Left—J. C. Cushing, chief technical engineer of Hercules Powder Co. Right—John Schreiner, production manager of Blue Diamond Co.



Earl Mack, quarry foreman, fired blast

"It isn't often that such a commonplace thing as a rock quarry can attract the interest of thousands and lure them 60 miles from their homes.

"And yet more than 15,000 people stood grouped in a mass before the Blue Diamond quarry on the afternoon of Sunday, April 27. Before them stood a crushed-stone quarry and mill—the first, perhaps, that many of them had ever seen. In this group were scores of architects and contractors, but the throng was mainly comprised of laymen. But all, however, had a common interest and the same topic of discussion—rock.

"This multitude reached the quarry in a caravan of thousands of automobiles, spending hours to move inch by inch through hoof and mouth disease quarantine stations that were stretched across every highway. They parked their cars, trudged over dusty roads and climbed steep mountains. They did not come to merely gaze upon a towering face of porphyry, nor to study rock and crushing machinery. They came to be thrilled, but in the hours of waiting they had a chance to think more about rock than ever before.

"Halt! the Dust-Brown Ranks Stood Fast. Fire! Out Blazed the Rock Blast"

"Promptly at 2:25 p. m. o'clock there echoed a weird, uncanny resonance—the warning of a blasting siren. Then a tensely silent wait of three minutes to allow the whistle operator to reach a point of safety. An arm was raised to 'Fire.' The blades of a switch snapped closed and the assembled thousands 'got' their thrill.

"A million tons of rock shot out from the

The World's Greatest Explosion—*Blue Diamond Corona Quarry*—April 27, 1924, 2:30 P. M. SHARP

NOTICE

Keep Your Eyes Inside the Dotted Line

What You Will See

Close-Ups *at the* CORONA Quarry *of the* Blue Diamond Co.

Reaping the Harvest of Millions of Years

HOW TO GET THERE

BASEBALL GAME
Blue Diamond vs Corona
10:30 a. m. at City Park

Part of souvenir program distributed to visitors giving many odd bits of information about explosives and quarrying in general—and quite a bit about the Blue Diamond Co. and the products it makes and sells

base and another million tons held in the high straight cliffs came tumbling down with a thundering roar. In the short space of a few seconds 182 tons of dynamite had spent itself and the largest volume of rock ever thrown upon a quarry at one time lay waiting to be sent into hungry crushers.

"The world's largest dynamite explosion was over.

"To the multitude, this giant blast was an exhibition—terrible and majestic. But in the world of rock production, it was only a necessary operation. True, it was larger than any quarry blast ever made before, but it was made solely in the interest of good economic business and not for the purpose of giving a thrill to an invited crowd.

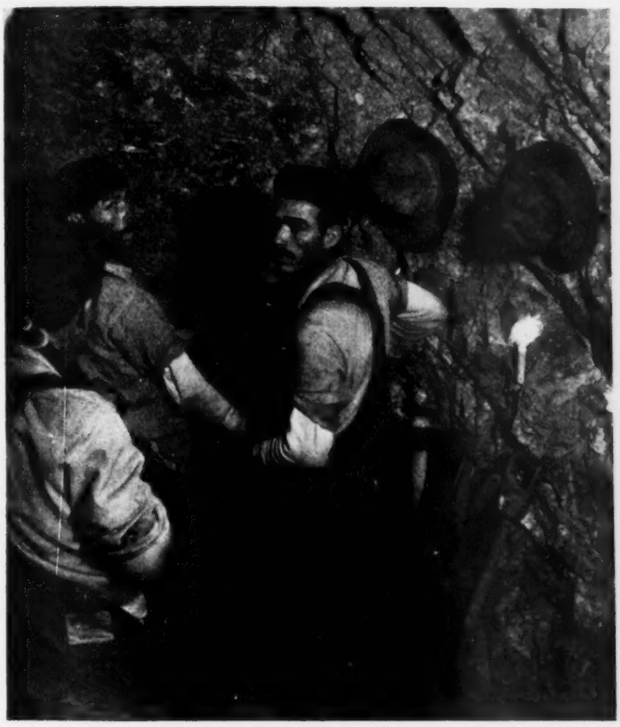
"So, perhaps all the quarrymen want to know is the economic side of the blast. They want to know whether efficiency and economy were served by gambling so much money on a single shot.

"According to superficial calculations made immediately after the blast, the record charge of explosives yielded approximately 2,000,000 tons of rock. This volume, even after charges for necessary 'block holding' are deducted, is expected to represent a cost of less than 3 cents per ton for shooting.

"In addition to this resultant economic advantage, high cliffs, which have menaced the Blue Diamond's quarry operations for many months, have been reduced. The possibility of additional slides has also been minimized and men and machinery will be able to work in greater safety in the future.

"The diagram herewith is our engineer's plan of the tunnels and pockets and is substantially correct. The explosion was a splendid success economically, yielding the anticipated volume of tonnage and leaving a splendid face. The rock broke beautifully in small sizes over the entire floor and we will have very little block shooting to do.

"The shot itself was a perfect demonstration of explosive mastery. The quarry face broke precisely according to calculations of J. C. Cushing, chief technical engineer of



Hewing out one of thirteen powder pockets

In the process of drilling the coyote tunnels

Sign stretched across quarry face—and a little visible evidence of the amount of explosives required for the 182-ton charge in the tunnels

Testing firing wires with galvanometer in front of one of the tunnels. Left—Electrician. Center—W. R. Ellise. Right—J. C. Cushing

the Hercules Powder Co., who personally supervised the loading and firing. Mr. Cushing was ably assisted in the work by A. McQ. Williams and W. R. Ellis, both of the Hercules company.

"Three cayote tunnels were driven 100 ft. into the quarry face. Cross cuts were run in both directions and 13 pockets hewn out. The explosives used were 'Hercules R.R.P.,' 'Hercules Special No. 1' and 'Hercules 60%.'

"The big blast was the first step in a program of expansion and improvement contemplated at the quarry. Several new crushers will be installed, as well as a complete new system of screening.

"The Carnegie Institution of Washington, D. C., had five technical observers with special watches stationed at the firing switch. A special seismograph was set up in the Mt. Wilson observatory for the special purpose of calculating the earth wave motion created by the explosion. This scientific delegation was in charge of Dr. Harry O. Wood, research associate of the Carnegie Institute.

"The motion picture news weeklies and several local studios had a total of 28 motion-picture cameras stationed on the opposite mountain to record the blast."

For the convenience of spectators an interesting folder, a part of which is illustrated herewith, was prepared. This folder gives the following "facts in a nutshell":

THE EVENT—Largest non-accident dynamite explosion in the world.

THE PLACE—Million-dollar crushed stone quarry of the Blue Diamond Co., in Hoag's Canyon, about four miles southeast of Corona, Calif.

THE TIME—Sunday, April 27, 1924, at 2:30 p. m. sharp.

THE PURPOSE—To reduce the menace of high cliffs to quarry operations and obtain a maximum volume of rock in a single shot for commercial purposes.

THE PREPARATION—More than two months were required to drill the tunnels into which the explosives are loaded.

THE METHOD—One thousand feet of "Coyote" tunnels drilled into the heart of the mountain, with 13 pockets, or rooms, 12 ft. by 12 ft., hewn out of solid rock will be loaded solidly with dynamite.

THE EXPLOSIVES—182 tons of straight high explosive dynamite will be used.

THE RESULT—A total of more than 2,000,000 tons of rock will be displaced and shattered.

THE LOADING—It will require six days for a small army of men to pass the great volume of dynamite from hand to hand in loading.

THE SHOOTING—High explosive detonators and picric acid crystals rounding the charges in each pocket will be linked together with electric wires and fired from a master firing switch located in the tower of the mill house.

SPECTATORS—An invitation is issued to the general public to witness this record explosion from an opposite hill owned by the company and affording an excellent view of the entire operation.

SAFETY—There will be no shower of rock and the territory outside of the danger zone will be safe.

AUTO PARKING FOR VISITORS—Spectators will be guests of the company and are warned against paying anyone for admission or parking.

HERE'S TIME AND SIGNAL SCHEDULE

John Schreiner, production manager of Blue Diamond, who will give the order to fire, has announced the following schedule:

1:00 p. m. Four long blasts of whistle ordering all visitors to leave the mill and quarry.

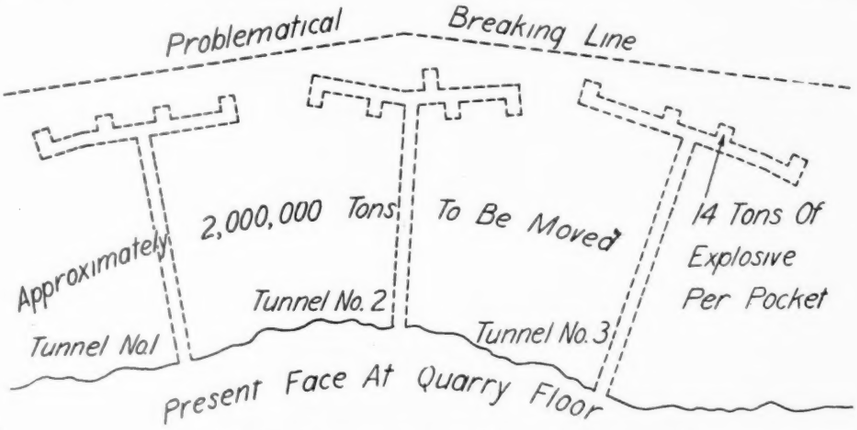
1:30 p. m. All employees and quarry men will leave mill and quarry floor. Only explosive engineers and power experts will remain.

1:45 p. m. Final search of quarry to make sure no living thing is left in path of explosion.

2:00 p. m. One long blast of whistle. Set all watches at 2 o'clock.

2:15 p. m. Wire tested and strung to mill tower ready for connection to firing switch.

2:20 p. m. Powder experts and officials leave quarry floor.



Plan of Corona quarry blast of the Blue Diamond Co.

2:23 p. m. Electric wires are connected to firing switch.

2:25 p. m. Steam whistle begins regulation blasting signal. A succession of short whistles continuous for exactly two minutes. (The intervening three minutes will allow whistle operator to reach a point of safety.)

2:30 p. m. THE WORLD'S LARGEST DYNAMITE EXPLOSION.

The foregoing description states the blast was shot at 2:28 p. m.—*two minutes ahead of schedule*—not bad, as such things usually go!

The souvenir program contains a lot of other interesting information that we have no room for here, but we will give just one more sample of publicity methods that get publicity:

SOME INTERESTING COMPARISONS

The Blue Diamond blast will tear out a volume of rock equal in weight to five Biltmore Hotels.

Somebody has figured that a mule can kick one ton .57 of a foot. On this basis, the 5,506,000 mules in the United States would each have to kick 194 times to move the same weight an equal distance.

More than four times the combined weight of all battleships in the U. S. Navy will be moved 300 feet in a few seconds.

If every man in the active army of the United States, numbering 136,619 men, were given a shovel and put to work at the Blue Diamond quarry, it would take them 228 days, 5 hours and 2 minutes to move the same volume of rock.

It would require 40,000 freight cars, or a solid train more than 300 miles long, to transport the amount of rock to be shattered.

This single charge of dynamite will tear from the mountain a volume of rock sufficient to furnish the aggregate for 215 Washington monuments or a 5-ft. sidewalk reaching twice across the United States or a 16-ft. paved highway from Los Angeles to Chicago.

In other words, enough rock to give all the wheelbarrow "chauffeurs" in California a nightmare.

As the Newspaper Reporters Reported It

THE first page of the Los Angeles *Times* of April 28 with a full-width headline gives the following story of the big blast:

THOUSANDS WATCH GIANT BLAST

ARTIFICIAL EARTHQUAKE FELT FOR MANY MILES

Mountain of Rock Moved When Nearly Two Hundred Tons of Explosive Is Touched Off

CORONA, April 27.—With a crash that rattled windows over a fifteen-mile radius, the greatest artificial earthquake ever produced tore loose 3,000,000 tons of rock at the Blue Diamond quarry today while 40,000 spectators looked on.

The electric button that started the temblor was touched at 2:30 p. m. precisely, and as the spark leaped three great heaps of dynamite in three tunnels drilled into a mountain side let go their tremendous force at once. There were 183 tons of the explosive, the greatest amount ever set off at any one time in the history of the world.

THOUSANDS GATHERED

The thousands gathered on surrounding hills felt first the shock of the blast, then heard a cracking roar that seemed to grow in volume as the whole cliffside into which the three powder tunnels had been driven leaped toward them.

Though everybody was believed to be at a safe distance, few were none too far away and many of the sightseeing parties were showered with chips and flying fragments. From the center tunnel burst red flame and black smoke in a great swelling mass, and rock fragments were thrown a thousand feet or more.

The explosion had been so nicely calculated, however, that there was little wasted force and the blasted cliff did not lift—it fell.

FORCED STRAIGHT OUT

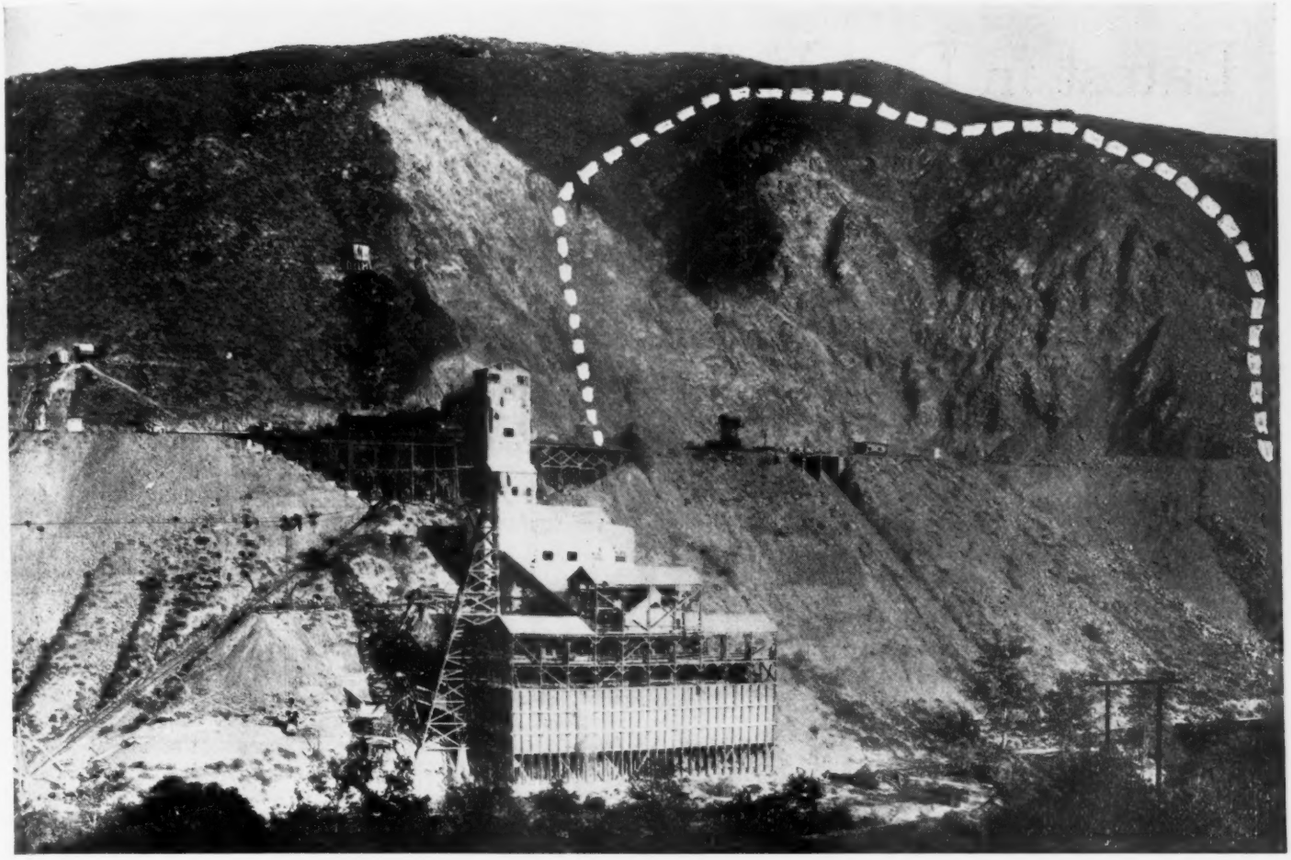
It was forced almost straight out over the little valley and crumbled down into the quarry, where it will furnish, it is estimated, a supply of rock that will last 18 months.

No one was hurt, so far as could be learned, and if there were any injuries they must have been of slight nature.

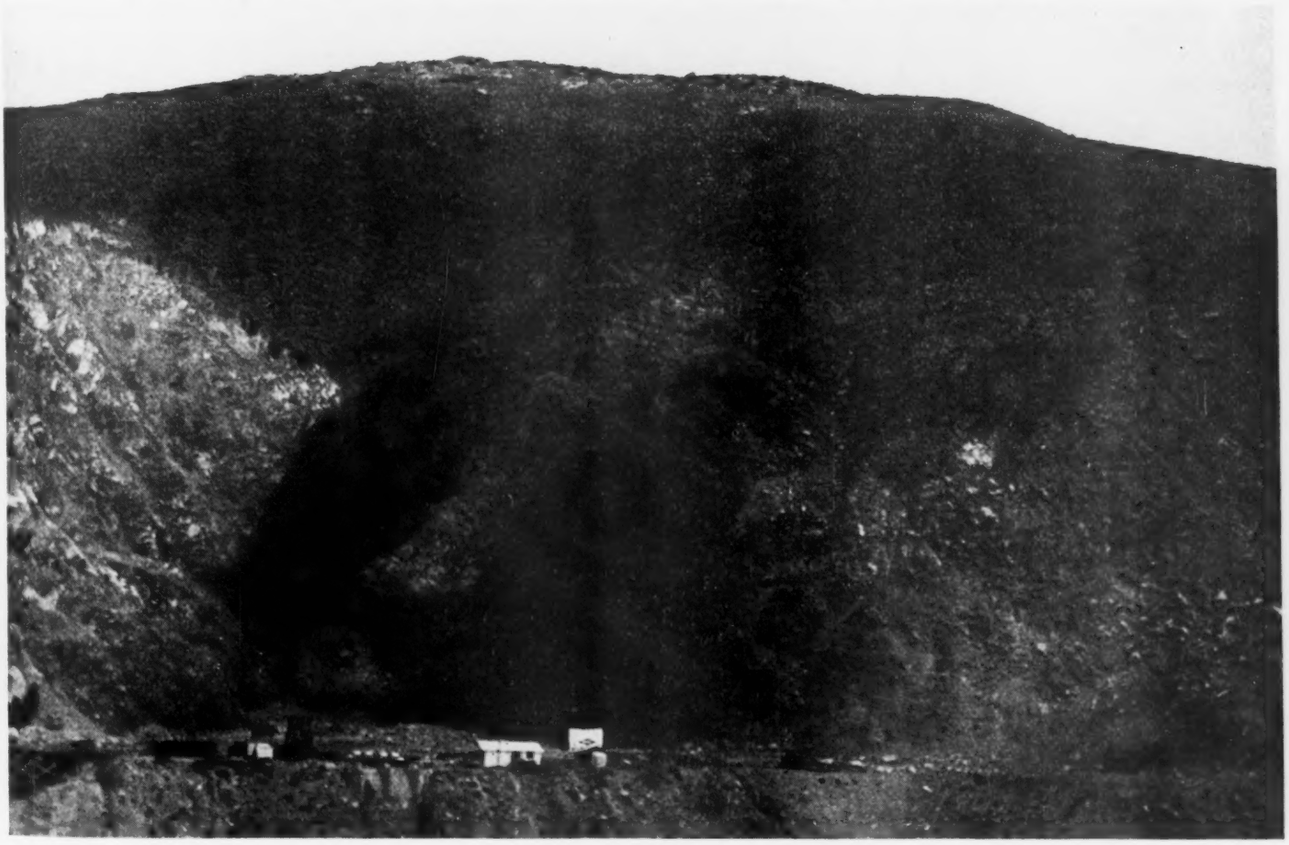
Scientists at Mt. Wilson were much interested in the explosion and expected to gain data of considerable importance about the speed with which such temblors travel through the earth's crust. Their observation, however, were made upon the mountain top, but they had observers present to note the exact time at which the explosion took place.

The big show cost about $75,000.

A description of this quarry and crushing plant operation together with the company's other plants and activities will be found in ROCK PRODUCTS, January 12, 1924—The Editors.



Plant of Blue Diamond Co. Dotted line shows area of the principal action in mighty blast



Just as she blew (No. 3 tunnel not yet out)

Latest in Des Moines River Sand Plants

Capital City Sand Company Erects All Steel Plant with Many Innovations

By Charles A. Breskin

ANYONE at all familiar with the sand and gravel industry along the Des Moines river in Iowa knows that the crying need of producers is for more gravel and less sand. Most of the deposits have but little more than 15 or 20% gravel and as a result thousands of tons of sand are wasted every year. This has made it necessary for existing producers to continually prospect for new deposits—deposits where they could find a good percentage of gravel.

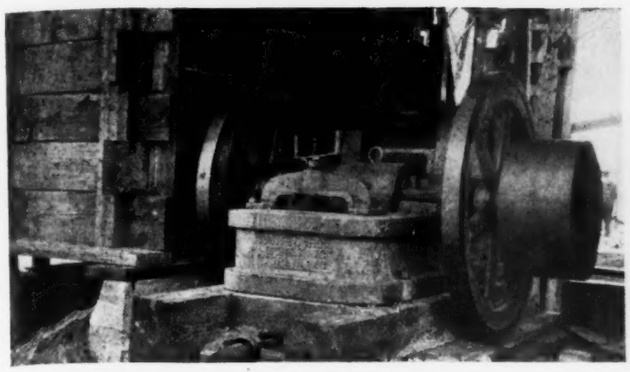
The Capitol City Sand Co., which has been in the sand business in Iowa for the past nine years, last year established a plant on the Des Moines river, about 1½ miles out of the city limits of Des Moines. A centrifugal pump was employed to get the material out of the river bed. As the operation continued they ran into "niggerheads" the size of a man's head. This played havoc with the pump and it was not infrequently that production was at a standstill.

This condition made it necessary for the company to thoroughly prospect their deposits. Test holes to a depth of 50 ft. indicated at least 35% gravel and enough "niggerheads" to warrant a crushing plant. At the same time they came to a realization that it was impossible to use a centifugal pump to dredge the material. After a thorough study of conditions it was decided to use a dragline cableway excavator. Around this one central unit there has been erected a plant that is a radical departure from anything found around the vicinity and something that can be duplicated in but few places in this country. The plant was designed for permanency, yet it has the portability feature. Labor saving machinery was installed throughout.

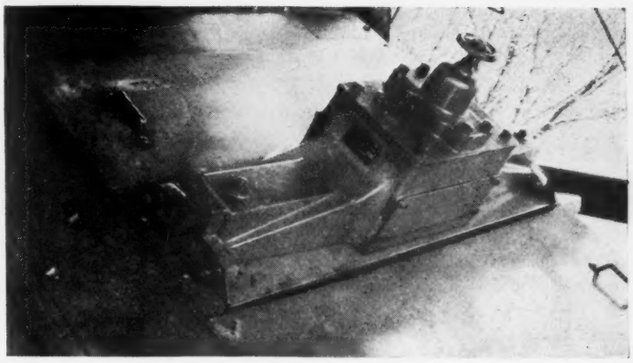
Side elevation of plant

The plant consists of a 1½-yd. Sauerman dragline cableway excavator with a 100-ft. all steel mast. It operates over a span of 800 ft. across the Des Moines river and it has been estimated that in this span alone there is enough material for five years operation. The dragline cableway system is operated by a special two-drum Sauerman hoist direct connected to a 100-hp. Lincoln motor. A fan driven by a 1-hp. motor is provided to cool off the motor. The system

New plant of the Capital City Sand Co., Des Moines, Iowa. The tower and mast are of all-steel construction built in sections. This combines permanency and portability



The 11x18-in. jaw crusher takes care of all the oversize in the plant. A 75-ft. centers bucket elevator reclaims the crushed gravel



A Hummer electric vibrating screen does all the final sizing. At present two separations are being made

has a 1⅜-in. carrier cable and a ⅞-in. pull cable.

The screening plant is a very simple and compact affair. It is located on a 75-ft. all-steel tower, adjoining the dragline cableway mast. Both tower and mast were erected in sections and when the dragline cableway has reached the limits of its range of operations the tower and mast can be easily taken apart and moved to some other location.

The dragline cableway bucket discharges to an initial 10-in. grizzly on top of the steel tower. The material over 10 in. is rejected back into the river, while that under goes to a second grizzly spaced 4 in. apart.

On the second grizzly, that over 4 in. is chuted to a 100-ton bin ahead of an 11x18-in. United Iron Works jaw crusher. The material under 4 in. goes to a hopper of 50 tons capacity just ahead of the main screen. The crusher is driven from a 25-hp. motor and the material is fed to it from a gate in the crusher bin. As the gravel is crushed it is reclaimed by a bucket elevator and deposited back into the bin or hopper ahead of the main screen.

The main screen is a rotary, double jacketed, 4x12 ft. The inner jacket has ¾ in., ½ in. and 2¼ in. perforations; the outer all ¼ in. perforations. Any material over 2¼ in. in size is returned to the crusher bin. The material from ¼ in. to 2¼ in. goes to an inclined screw conveyor, which carries it to a hopper just ahead of a Hummer screen.

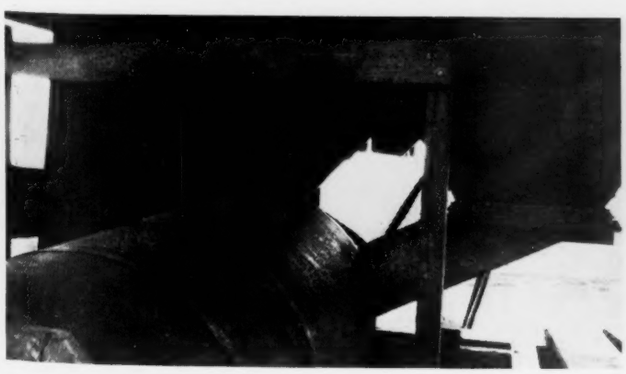
The 100-ft. steel mast and 75-ft. steel tower. The tower contains all of the screening and washing equipment

In this plant the rotary screen is merely a scalper, the purpose being to get rid of all the sand and oversize. The inclined screw conveyor, besides conveying the gravel, acts as a classifier and dewaterer. It is here that silt and sticks are rejected. All the sizing is done in the "Hum-mer" screen, from which the material goes to the loading bins to ground storage.

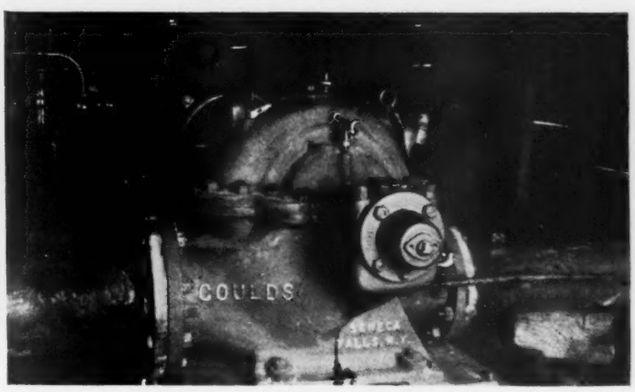
All the material ¼ in. and under from the scalper is classified as sand and is flumed off into car loading bins or to ground storage. Settling tanks are yet to be placed under the sand flumes so that a finer separation may be made of the sand itself.

It is estimated that this plant will have a 1000 tons capacity per 10-hr. day with the present equipment and that only six men will be required to run the entire plant. However, if the screening equipment should not have ample enough capacity or if it is desired to increase the capacity, the tower is so designed that a duplicate screening plant can be erected. All that will be required is another scalper, screw conveyor and Hum-mer screen. A total of 225 hp. is required to run the present equipment.

Another thing of interest in this plant is the facilities for ground storage. The bin storage mentioned before will only have capacity for one car. Otherwise everything will be loaded into cars with a crane. A good idea of the available storage space can be had from some of the accompanying photographs. The track arrangement for loading is ideal and there is room enough



This 4x12-ft. double jacketed screen acts as a scalper. It takes care of the oversize and all the sand



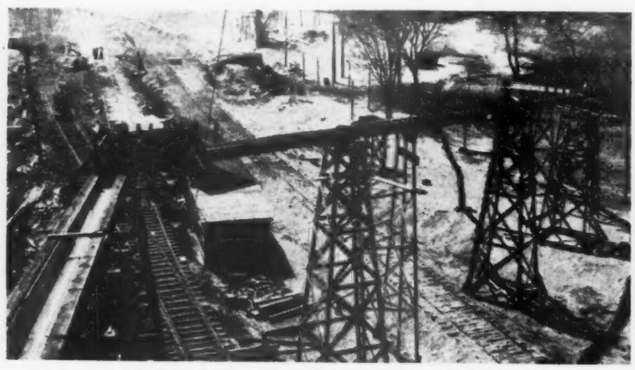
An 8-in. split-head centrifagal pump run by a 50-hp. motor furnishes all the water for washing purposes

for 25 empties and 25 loaded cars.

In providing water for washing purposes there is an 8-in. Gould's centrifugal pump, direct connected to a 50-hp. motor. The pump has an 8-in. suction and a 6-in. discharge. The steel tower and mast were fabricated by the Pittsburgh-Des Moines Steel Co.

As mentioned previously the plant is only 1½ miles out of the city limits and within trucking distance. Moreover, it is located in a direction where the city is growing the fastest. All rail shipments will go over the Central Iowa Railway, an interurban system.

The officers of the Capital City Sand Co. are A. J. Haskins, president; Frank E. Ray, vice-president, and C. V. Ray, secretary-treasurer. The main office is in Des Moines.



View from top of steel tower showing sand flumes. Settling tanks will be put in under the flumes to classify sand. Note ample trackage for car storage

Looking down the Des Moines river. The pipe line in the foreground is from the centrifugal pump furnishing water for washing purposes

Fluorspar Production in 1923

THE shipments of fluorspar in 1923, according to a statement given out by the Department of the Interior compiled by Hubert W. Davis, of the Geological Survey, showed a decrease of 16% in quantity and 3% in total value as compared with 1922. The reported average selling price f.o.b. mine shipping point increased from $17.88 in 1922 to $20.69 in 1923. Colorado and New Mexico were the only states that showed an increase in 1923. The decrease in shipments in Illinois amounted to 23%. The shipments of fluorspar to foundries and for use in the manufacture of hydrofluoric acid, glass, enamel, and sanitary ware were larger than in 1922, and the shipments to steel plants and for export were smaller. The stocks of fluorspar at mines or at shipping points at the end of 1923 amounted to about 64,000 short tons as compared with 33,337 tons at the end of 1922. These stocks are the largest ever accumulated by producers.

The imports of fluorspar into the United States in 1923 amounted to 42,226 short tons, the largest since 1910. The imports in 1923 were equivalent to 35% of the domestic shipments of fluorspar as compared with 23% in 1922. England was the principal source of the imports, supplying 54% of the total. The importation from British South Africa of 10,380 short tons of fluorspar, practically all of "acid" grade, is noteworthy. Imports from Italy, China, and Netherlands were recorded for the first time in 1923.

The producers of about 95% of the basic open-hearth steel made reported that they consumed 130,499 short tons of fluorspar in 1923 and had stocks on hand amounting to 47,219 short tons on January 1, 1924. If the steel companies that did not report consumed a like proportion of fluorspar, the figures given indicate a total consumption in all steel plants of about 137,000 tons in 1923 and total stocks of about 49,700 tons on hand January 1, 1924. The total consumption of fluorspar by steel plants in 1922 was about 104,000 tons and the total stocks on January 1, 1923, were about 65,000 tons. The consumption of fluorspar per ton of steel produced in 1923 average 8.1 lb., as compared with 7.4 lb. in 1922.

FLUORSPAR SHIPPED IN 1922 AND 1923, BY STATES

	1922			1923		
		Value			Value	
State	Short Tons	Total	Average	Short Tons	Total	Average
Illinois	83,855	$1,493,188	$17.81	*64,700	*$1,426,300	*$22.04
Kentucky	52,484	970,059	18.48	45,441	945,402	20.81
Colorado	2,309	20,169	8.73	*5,000	*49,000	*9.80
New Mexico	2,180	30,992	14.22	*3,800	*40,800	*10.74
New Hampshire	768	16,757	21.82	142	6,356	19.26
Utah				188		
	141,596	$2,531,165	$17.88	*119,271	*$2,467,858	*$20.69

*Approximate and subject to revision.

FLUORSPAR SHIPPED IN 1922 AND 1923, BY USES

	1922 (Final)			1923 (Approximate)		
		Value			Value	
Use	Short Tons	Total	Average	Short Tons	Total	Average
Steel	122,403	$1,987,586	$16.24	95,733	$1,751,465	$18.30
Foundry	2,998	57,011	19.02	3,206	71,318	22.25
Glass, enamel, and sanitary ware	8,904	323,116	36.29	10,718	388,015	36.20
Hydrofluoric acid	4,782	118,648	24.81	6,631	193,406	29.17
Misc. and unknown	213	3,838	18.02	1,839	38,342	20.85
Exported	2,296	40,966	17.84	1,144	25,312	22.13
	141,596	$2,531,165	$17.88	119,271	$2,467,858	$20.69

FLUORSPAR IMPORTED INTO THE UNITED STATES, BY COUNTRIES, IN 1922 AND 1923*

	1922			1923		
		Value			Value	
Country	Short Tons	Total	Average	Short Tons	Total	Average
Belgium	71	$ 1,187	$16.72	35	$ 712	$20.34
British South Africa	486	8,415	17.31	10,380	157,625	15.19
Canada	2,877	32,679	11.36	.....	5	.....
China	.....	.....	.....	90	1,183	13.14
Czechoslovakia	34	761	22.38	.....	.....	.....
England	23,836	206,950	8.68	22,862	202,548	8.86
Germany	5,804	49,196	8.48	8,580	67,595	7.88
Italy	.....	.....	.....	268	2,471	9.22
Netherlands	.....	.....	.....	11	180	16.36
	33,108	$299,188	$ 9.04	42,226	$432,319	$10.24

*Figures compiled from records of Bureau of Foreign and Domestic Commerce.

Fluorspar Property to Be Sold

THE Spar Mountain Mining Co. properties at Cavein Rock, Hardin county, Illinois, were sold under foreclosure proceedings by bondholders on May 6 at the county seat, Elizabethtown, Ill.

Spar Mountain has been a good producer since 1918, but heavy organization, legal and investment outlays impaired its financial position and brought about foreclosure by bondholders. An official of the company says:

"Several of the largest producing fluorspar mines in the southern Illinois section have been flooded recently, perhaps absolutely drowned out. This will result in temporary if not permanent reduction in output, which, coupled with increased demand, will most certainly result in an advance in prices. Ownership of a producing mine solves the steel company's problem of securing its supplies of the raw material at a low price, and several of the big companies have already invested in fluorspar properties."—*Iron Age.*

Big West Coast Gravel Producers Take Up Manufacture of "Stone-Tile"

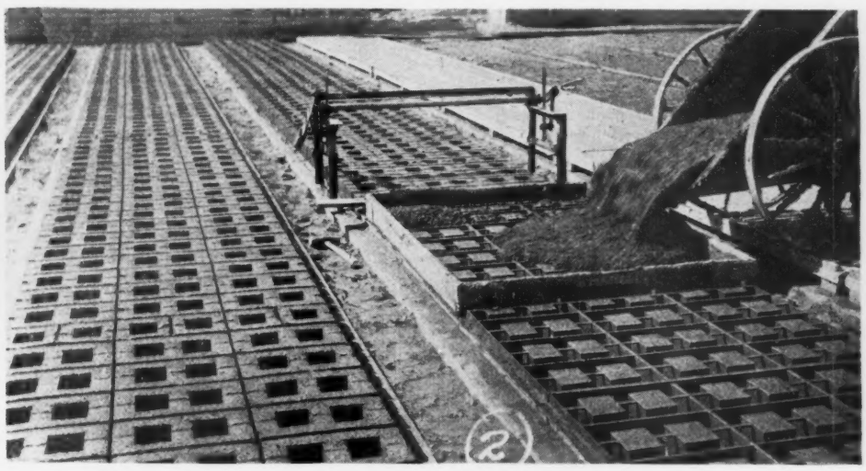
SIR—Inasmuch as there is keen interest in concrete products among producers of gravel and rock over the entire country, it occurs to us that your readers may be interested in the progress which is being made by the "Stone-Tile" manufacturing agencies on the Pacific coast.

H. H. Fillmore, formerly district engineer for the Portland Cement Association at Los Angeles, and E. F. Wiley, formerly of this company (The National Stone-Tile Co.), and of the Portland Cement Association, have formed a corporation in Los Angeles of which George Rogers, president of the Union Rock Co. (which produces about 3,000,000 tons a year), and Arthur Bent of Bent Bros., formerly president of the Associated General Contractors of America, are leading stockholders. The Stone-Tile plant consists of a tract of several acres adjoining the Union Rock Co.'s plant.

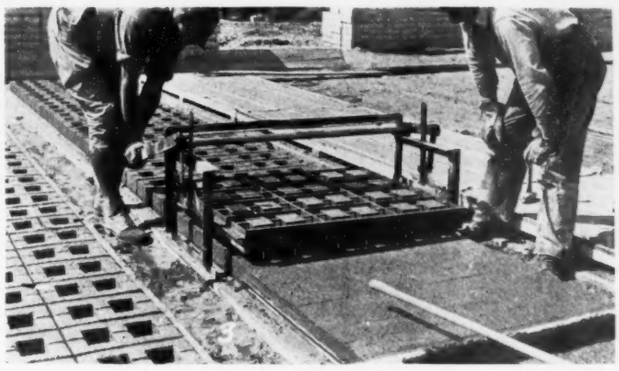
The Rhodes-Jamieson Co., who are producers of sand and gravel and crushed rock and who sell 60% of the building material sold in the East San Francisco Bay district, have been manufacturing this product for over a year and have many creditable structures of this product in their city.

The Pioneer Sand and Gravel Co., the largest producers at Seattle, have been selected as our agents at that point and are now installing a manufacturing plant at their gravel pit, from which point they expect to barge the finished product to all points in Puget Sound. In addition they will have another plant in the heart of the city of Seattle.

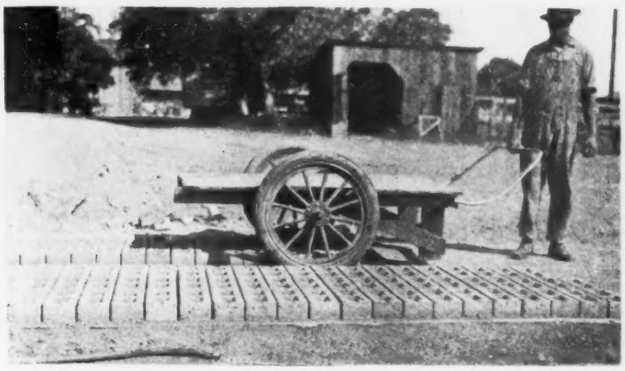
Dressing the sand beds for placing the forms



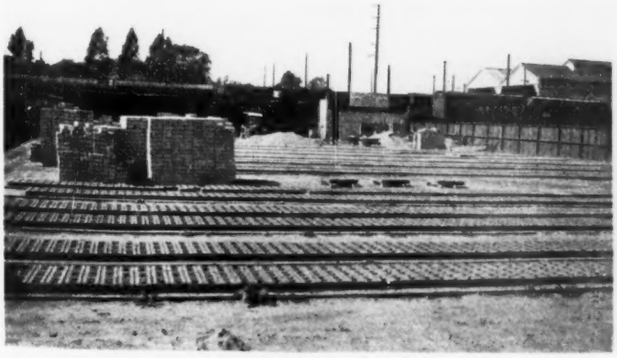
The forms are placed on the dressed sand bed and filled from a buggy with mixed concrete



The forms in position ready for filling



Truck used for carrying the finished tile



Yards showing tile which is curing and in storage

A close-up of mason laying the tile in the wall

In the smaller communities Stone-Tile is handled by the leading building material dealers in various communities.

One of our standard advertisements which is appearing in many of the Pacific coast papers is shown herewith. Inasmuch as producers are now being selected in every important community, we thought this information might be of interest to you.

This company does not allocate any of its equipment or agencies until our district office is established for the purpose of promoting the sale and use of the material co-operatively with the concerns selected as our manufacturing representatives.

C. C. H. THOMAS,
National Stone-Tile Co.
San Francisco, Calif.,
April 23, 1924.

Build with
STONE-TILE
A Hollow Concrete Brick of Nationally Standardized Quality
Least Cost for PERMANENT Construction
TO ARCHITECTS:—
Eventually a Plant in Every Important Community in the United States
Your Local Stone-Tile Manufacturer
Rhodes-Jamieson & Co.
OAKLAND ALAMEDA BERKELEY
STONE-TILE

One of many similar advertisements in West Coast papers

Subtle Clay Brick Propaganda

WIDELY printed extracts from the monthly Digest of Common Brick Industry contain the following paragraphs:

"The brick manufacturers of the Atlantic seaboard still have one eye at least open for the foreign brick situation. Authentic reports covering the receipts of 1923 provided that there was much exaggeration in earlier estimates of quantities received. Not more than 50,000,000 brick were received altogether from foreign ports, and much of this, in fact, was not brick at all but a substitute made out of sand and lime. This material moved slowly and in fact some of it is still in the hands of the dealers.

"One contractor erecting a building in Philadelphia and having shipped a quantity of this imitation of brick from the jobber in New York had the unusual experience of having his so-called brick burned up before he could get them in the wall, having been exposed to a fire across the street."

When an industry reaches a stage where it can't exist, or thinks it can't exist, without spreading lies about competitive materials, any right-minded person knows it has no right to exist.

Minneapolis Leads in Cement Block Making

ACCORDING to the Minneapolis, Minn., *Journal*, Minneapolis is the nation's largest producer of concrete blocks and last year more of these blocks were turned out at plants in this city than ever were made in one year in any city.

The output of 35 concrete products plants in Minneapolis last year was valued at about $2,500,000 and 400 men were in employ of these concerns.

Concrete building blocks, concrete building tile, brick, sidewalk tile, laundry tubs, garden furniture and silo staves are among the products of these concerns.

In 1923 more than 5,000,000 concrete blocks were manufactured in plants in Minneapolis.

Manufacturers said that the availability of sand and insistence by the producers that only quality blocks be permitted to be sold have caused steady increase in the business.

Minneapolis ordinances, which require a block to stand a test of 1200 lb. to a square inch and which provide for rigid inspection, have been adopted in many cities.

The Minneapolis Concrete Products Association, with which most of the manufacturers are affiliated, is eight years old and is the only organization of the kind in the United States, which is more than two years old.

A. L. Anderson is president of the Minneapolis association; Warren F. Carr is secretary, and Jordan Johnson is treasurer.

We Have Another Namesake in Florida

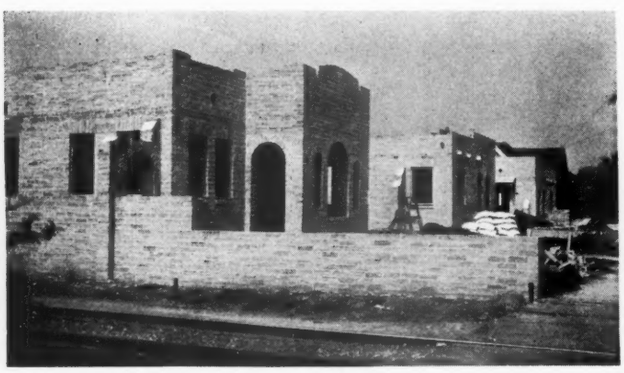
ROCK PRODUCTS has noted with pleasure the incorporation and growth of Rock Product Companies in various states. We believe we now have namesakes in California, Utah, Illinois and elsewhere who produce *rock products*. We welcome such namesakes. Now we announce the Florida Rock Products Co., Tampa, Fla.

The Florida Rock Products Co. opened a quarry near Brooksville, Fla., for the purpose of furnishing rock base material for the Hillsborough county road work in March, 1923. Preliminary prospecting had failed to show that the deposit contained a very high percentage of valuable building rock, this being disclosed as the operations of the quarry progressed.

After operating during 1923 as a plant for the production of rock base material, the entire old plant was demolished and in its place was erected one of the finest, and in fact the only large crushing plant in the state of Florida, for the production of high grade crushed stone. The new improvements, made at a cost in excess of $175,000 provide a product heretofore unobtainable in the state.

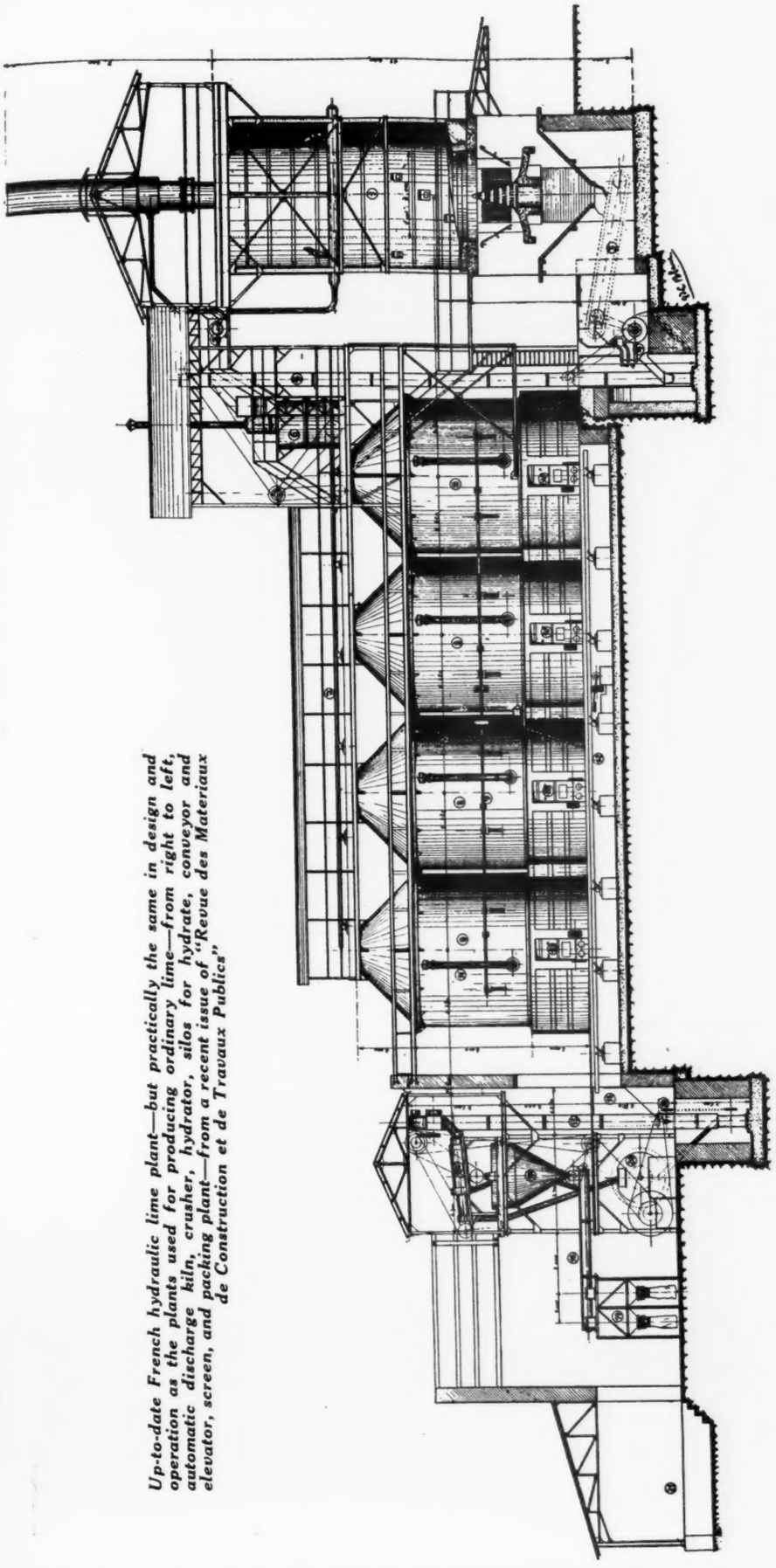
This stone is now being used on federal and state highway, municipal and building work, supplants material which it has always been necessary to ship from great distances, and is therefore a material appreciation to the wealth of Florida.

William J. Porter of Tampa, is president of the Florida Rock Products Co.



Houses of California type built of tile and ready for stucco finish

The completed houses after the finish of stucco has been put on



Up-to-date French hydraulic lime plant—but practically the same in design and operation as the plants used for producing ordinary lime—from right to left, automatic discharge kiln, crusher, hydrator, silos for hydrate, conveyor and elevator, screen, and packing plant—from a recent issue of "Revue des Materiaux de Construction et de Travaux Publics"

Maufacture of Hydraulic Lime in France

HYDRAULIC lime is not much made in this country but a considerable amount is imported from France for use in masonry mortar on account of its non-staining qualities. Grappier cement, made from the pulverized lumps, or culls, left behind when hydraulic lime is slaked.

Hydraulic lime is a true cement. The temperature of burning has to be higher than that required for mere decarbonization in order to form alumina and silica compounds with the calcium oxide. The distinction between hydraulic lime and natural cement is that hydraulic lime will slake while natural cement will not; or, in other words, natural cement has to be ground before it can be used while hydraulic lime does not. But, like other hydraulic cements, hydraulic lime will set under water, although very slowly.

The French hydraulic limestones show a CaO content from 45.4% to 47.5%, SiO_2 from 12.4% to 16.9%, and Al_2O_3 from 0.60% to 0.81%. Iron oxide, Fe_2O_3, runs from a trace to 0.50%. The burned lime has from 20% to 23% SiO_2, and CaO from 65% to 78%, with $Al_2O_3+Fe_2O_3$ from 1.00% to 4.38%.

The plant shown on this page is one designed by J. E. Duchez whose articles on the constitution of portland cement are being published in ROCK PRODUCTS. It is for continuous operation. The discharge from the kiln at the right is rendered continuous by the cone and revolving grate. The burned lime goes then by a pan conveyor to a jaw crusher and then to the hydrator. A conveyor of the impulse (push) type feeds it to the silos in which the hydration is completed. From these another conveyor carries it to an elevator from which a feeder sends it to an 8-mm. revolving screen. The oversize of this screen goes to a ball mill which is in closed circuit with the screen, the undersize goes to an air-separating system. The tailings from the air-separating system go to the ball mill and the fine powder goes by a screw conveyor to the sackers. It will be noted that the tailings and hard-burned clinker are thus ground up and added to the finished product. Indeed it is from these mills that most of the combined silicates and aluminates come.

The plant is typical of the modern French practice which is to make everything as automatic in operation as possible, avoiding handling by shovel and wheelbarrow. This is a distinct departure from older European methods and the methods used in too many American lime plants today.

Hydraulic limes were formerly manufactured in this country and doubtless would still find a market to be used where strength is not the most important consideration or where the "non-staining" or plastic qualities would give it the preference. The cost of manufacture is about the same as that of ordinary lime and the plant is similar.

Use of Lime in Water Purification

One of the Most Important Chemical Uses of Lime Which Can Show a Large Money Saving in Addition to Safeguarding Health

By F. M. Veatch
With Black & Veatch, Consulting Engineers, Kansas City, Mo.

LIME is one of the most widely used chemicals in the art of water purification and is without doubt, the most important of all since it enters into nearly every common process of water treatment.

Lime in water treatment is not particularly important insofar as quantity is concerned since this use requires but a small percentage of the total production, but in view of the fact water is a necessity to every person, and every industry, this use of lime is certainly one of the most important and most interesting of its many uses.

Lime is used in water treatment either in the form of quick lime (Ca O) or as hydrated lime Ca $(OH)_2$. The quick lime is cheaper per pound and is more efficient since one pound of quick lime is equivalent to 1.32 lb. of hydrated lime. However, owing to the trouble encountered in making milk of lime solution and the difficulty of keeping feed lines open, the use of hydrated lime has become almost universal.

This product is furnished in convenient 50-lb. paper sacks and may be stored indefinitely without the danger from air slaking which is experienced with quick lime.

The use of lime solutions has been widely displaced by the use of lime feeding machines which feed dry hydrated lime very satisfactorily and eliminate much of the labor and trouble due to handling the troublesome solutions.

Pure water, in the strict sense of the word, does not occur in nature, and the water which goes to make up our municipal, private and industrial supplies is seldom satisfactory, in its natural state, for all uses, and must be clarified, sterilized, softened, or given some other form of treatment.

Water may be "turbid" due to mud and silt or other solid matter which may be carried in suspension.

It may be "colored" due to dissolved organic matter from vegetation or animal life.

It may have odor due to sewage or trade waste pollution, decayed organic matter, or growths of micro-organisms.

It may be unsafe for human consumption due to bacterial pollution from various sources and it may be "hard" due to inorganic salts in solution.

The art of water purification has to deal with these conditions either singly or in combinations, and the method of treatment depends of course, on the character of the raw water and the uses to which the treated water is to be put.

THIS paper was prepared especially for Rock Products by a member of a firm known throughout the engineering world as one of the foremost authorities on water-supply and water-purification.

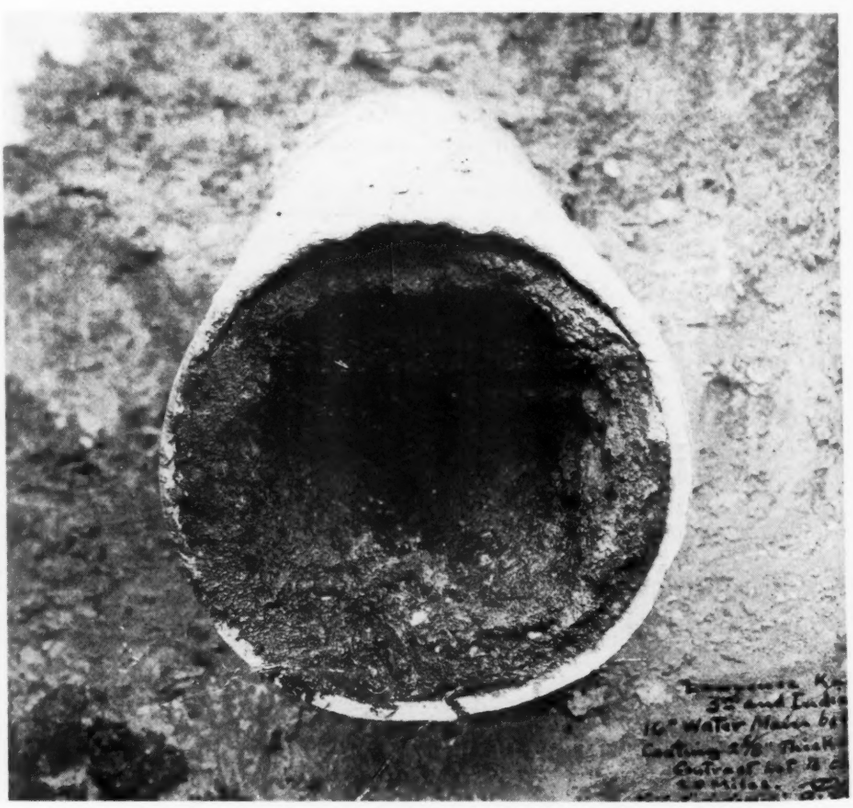
Our smaller municipalities are usually not particularly interested in soft water since the consumers are largely private and the prime requisite is a clear, colorless, odorless water which is free from dangerous bacterial contamination and such water is very commonly found in wells, springs and mountain streams.

Large cities however, must pay more attention to the requirements of industries and in addition, to the above mentioned qualities, a water must be reasonably soft to be satisfactory.

Steam plants, laundries, chemical works, dye works, paper mills and numerous other industries in which soft water is a necessity, commonly operate separate plants for this purpose. Lime enters into the problem as an aid to coagulation in the treatment for turbidity, as a softener in treatment of hard waters, as a re-agent in the removal of carbon dioxide and iron salts, and as a sterilizing agent (in the form of chloride of lime) in the treatment of waters which are contaminated with bacteria.

Extent of Water Purification

The urban population of the United States is in the neighborhood of 70,000,000 people and it is safe to say that the amount of water used each day is in the neighborhood of 100 gallons per capita, of which fully 75% receives some form of treatment, this represents 5,250,000,000 gallons per day, and



Water main at Lawrence, Kan., showing the result of hard water

one grain of lime per gallon represents a daily use of 375 tons.

The average purification plant where softening it not attempted will use from ½ to 3 grains of lime per gallon of water and when softening is desired this amount often reaches 20 grains per gallon of water.

A conservative estimate of the daily use of lime for this purpose would be approximately 5 grains per gallon or 1875 tons per day throughout the United States.

The last few years have seen a decided improvement in the quality of water furnished by municipal plants, and the demand for soft water in the home as well as in the factory or boiler room is increasing.

Exact data on treatment methods are not necessary or advisable in an article of this kind but the following brief outline covers in a general way the processes in most common use at the present time.

The treatment naturally resolves itself into four phases as follows:

1. Treatment for gases and odors.
2. Treatment for solids in suspension.
3. Treatment for bacterial contamination.
4. Treatment for dissolved salts. (Hardness.)

Treatment for Gases and Odors

The gases in water naturally are usually carbon dioxide, oxygen and nitrogen, but odors are usually gases or volatile matter of various kinds and in small quantities.

Of these gases, the carbon dioxide and the odors are the most important. Excess carbon dioxide retards coagulation, tends to hold the iron, calcium and magnesium salts in solution, and often attacks the iron of the pipe system, with a resulting formation of iron salts which color the water, clog service piping and stain plumbing fixtures. This reaction is the common cause of the "Red Water" trouble which is often experienced in "dead ends" of water systems.

Odors are usually not particularly harmful but they detract from the "attractiveness" of water for domestic use.

Aeration is usually relied upon to remove the odors and the greater part of the carbon dioxide, but for the complete removal of the latter, the use of lime is necessary.

Treatment for Solids in Suspension

This treatment applies to turbid waters which are not too "hard" for use, and consists of coagulation with sedimentation and filtration.

In this process, the coarser solids such as sand and heavy mud are first settled out and then a coagulant, usually aluminum sulphate (alum) or ferrous sulphate (copperas) is added, which coagulant combines with the carbonates in the water to form an insoluble flocculent precipitate which will on settling, carry down the greater part of the sediment and other solid impurities.

If ferrous sulphate is used, it is necessary to use lime also, in order to complete the reaction, in which the ferrous sulphate is changed to ferrous carbonate, then to ferric carbonate and finally to ferric hydroxide in which form it is known as the "floc."

If aluminum sulphate is used, lime is sometimes unnecessary but is very commonly used to hasten the reaction and numerous tests have shown that its use results in a saving of the more expensive alum.

Numerous attempts have been made to outline the amount of coagulant to be used for various alkalinities and trubidities, and in the hands of a trained operator the hydrogen ion concentration test is an excellent indicator but in actual practice, it seems that the "cut and fit" method is the one in most general use. Given a properly constructed plant, satisfactory water will be produced if the turbidity is reduced to from 40 to 60 parts per million before filtration.

The size of the settling basins and coagulating basins varies greatly with the character of the water to be treated, and the amount of clarification desired.

By prolonged settling (two to five days) after coagulation it is possible to procure a water which is practically clear, but on account of the expense of the large basins required, the trend of modern practice is to employ filtration for the final clarification of the water.

Treatment for Bacterial Contamination

As a safeguard against the presence of any harmful bacteria that may have survived the treatment as above described, it is customary to sterilize the water when it is to be furnished for domestic use.

For this purpose it is customary to use chlorine, either in the form of chlorinated lime or bleaching powder, or in the form of chlorine gas.

Chlorinated lime (commercial "bleach") is a product formed by allowing chlorine gas to come in contact with hydrated lime, and which contains from 30 to 35% by weight of pure chlorine. In practice the chlorine is leached out of the "bleach" by water and the resulting solution is fed into the water before it is pumped into the mains.

Ordinary filtered water can be sterilized by the use of 2 lb. of chlorine (approximately 6 lb. of chloride of lime) per million gallons.

Treatment for Hardness

Hard water is the term commonly used to designate water which is impregnated with any chemical or combination of chemicals, but the elements most commonly encountered are iron, calcium and magnesium in the form of carbonates, sulphates, and chlorides. Free acids or alkalis are very rarely found in natural waters but are usually the result of trade wastes, and in such cases special treatment is required. The same general scheme is used in water softening as in treatment for turbidity and it is very common to accomplish both results in the same plant simultaneously, since many turbid waters are so hard that softening is necessary.

The object of softening is to replace the iron magnesium and calcium salts by sodium and to leave in the water only sodium carbonate which is soluble, does not affect the use of soap, and does not form scale when heated in boilers, water heaters or other fixtures.

There is a limit to the practicability of water softening for boiler use however since with exceedingly hard waters, the resulting sodium carbonate solution is so concentrated that foaming occurs. It is seldom practical to soften a water which has more than 1000 parts per million of total hardness.

Iron salts are usually insoluble and occur only in the presence of carbon dioxide, thus they are easily removed by the use of lime alone.

Bicarbonates of calcium and magnesium and carbonates of magnesium may be removed by lime alone. The reduction of calcium, however, takes place only to the extent of the solubility of calcium carbonate, which amounts to approximately three grains per gallon.

Sulphates and chlorides of calcium and magnesium are by the use of soda ash changed to the carbonates of these metals, which are thus removed, and to the corresponding salts of sodium, which remain in solution.

In practice it is customary to feed the lime and soda ash together, in accordance with the calculated amount shown necessary by a chemical analysis.

Disadvantages of Impure Water

The disadvantages of impure water may be shown by actual money loss in case of laundry work, boiler operation and industrial use, by loss of life in case of water bourn epidemics, by loss of money due to the necessity of obtaining satisfactory drinking water from other sources such as bottled water, spring water, etc., and in many other ways. The following illustration shows the condition of the main supply pipe line at Lawrence, Kans., after having been in use for about 30 years with an iron impregnated water—it was necessary to clean 20 miles of mains in this city at a cost of several thousand dollars. Future occurrences of this kind have been guarded against by the construction of an iron removal plant but it would be extremely interesting to know just how much money was spent by property owners in replacing service pipes, plumbing fixtures, water heaters, etc., and by industrial users in boiler replacements, boiler compounds, private softening plants, etc. These figures are not available but there is no doubt of the fact that the total for the 30 years would exceed the cost of the new system.

Possibly the most successful attempt so far made to reduce the inconveniences of impure water to an expressible figure is given in "The Value of Pure Water," by George C. Whipple, who starts out in quoting the following from "Thoreau":

"The cost of a thing is the amount of

what I will call Life which is required to be exchanged for it."

Mr. Whipple developed the following formulae:

Depreciation due to sanitary quality

1. $D=2.75\ (T-N)$

in which D=depreciation in dollars per million gallons
T=typhoid fever death rate per 100,000
N=typhoid fever death rate, assumed to be due to causes other than water and which may be ordinarily taken as 20 per 100,000

Depreciation due to physical characteristics:

$$D=20-\frac{Pc+Pt+Po}{100}$$

$$Pc=\frac{c}{2},\quad Pt=5/\overline{t},\quad Po=20^2+3.50_d^2+50_o^2$$

in which
Pc=per cent of consumers who object to the color of the water
Pt=per cent of consumers who object to the turbidity of the water
Po=per cent of consumers who object to the odor of the water
C=color reading
t=turbidity reading
O_v=odors due to vegetable matter expressed according to standard numerical scale
O_d=odors due to decomposition expressed according to standard numerical scale.
O_v—odors due to microscopic organisms expressed according to standard numerical scale.

Depreciation due to hardness

$$D=\frac{H}{10}$$

in which H=hardness of water in parts per million.

These formulae were applied to the Croton river supply of New York and gave a depreciation of $11 per million gallons or nearly a million and one-half dollars a year.

A turbid water as is common in Western streams will have a depreciation of approximately $20 per million gallons and for a consumption of one million gallons per day this equals $7300 per year or enough to pay interest and sinking fund charges on a bond issue of $80,000, which exceeds the cost of such a plant.

In the case of water softening the saving in money is even more marked as is shown by the following table based on a report of the Chicago and Northwestern R. R.

COMPARISON SHOWING EFFECT OF WATER SOFTENING AT 17 STATIONS ON THE CHICAGO AND NORTHWESTERN R. R.

(The two years represent the condition before and after softening)	1902	1903
Ton mileage in million ton miles	2934	3154
Increase in ton mileage (7.5%)		210
Pounds of coal per 100 ton miles	28.7	27.5
Saving of coal per 100 ton miles		1.2
Saving in coal (at $3.00 per ton for 3000 million ton miles)		$30,000
Average assignment of engines (83% of them in constant service both years)	159	154
Saving in assignment of engines		5
Saving in engines (10% interest and depreciation on cost of 5 engines at $10,000 each)		$5,000
Number of boiler makers employed	36	23
Number of helpers employed	42	30
Total number of laborers on boilers	78	50
Saving in laborers (26%)		20
Saving in wages of boiler makers and helpers		$7,700
Saving in materials for boiler repairs—Not estimated but known to be large		
Boiler failures from leaky flues	544	99
Boiler failures from fire boxes	33	20
Boiler failures from arch tubes	6	1
Total	583	120
Reduction in number of boiler failures (79%)		463
Estimated saving to road, all causes		$75,000

It is to be noticed that this figure applies to labor and material prices current 20 years ago and would probably be more than doubled under present day prices.

These examples can be carried on through every industry with similar results and when the saving of human life, not to mention the saving of dollars to our industries is considered, it is a simple matter to realize the importance of water purification and softening.

Fuller's Earth

By Jefferson Middleton*

THE rapid increase in output and value of fuller's earth that began in 1913 and was interrupted in 1921 was resumed in 1922, the output in that year reaching the highest point recorded. This output was 32 per cent more than of 1921 and 8 per cent more than that of 1920, the year of greatest output next to 1922. The value of fuller's earth marketed in 1922 was exceeded only by that of 1920. It was 9 per cent less than that of 1920 but 16 per cent more than that of 1921. The imports of fuller's earth also increased in quantity and value. The rate of duty under the tariff act of 1922 is $1.50 per long ton for unwrought or unmanufactured fuller's earth and $3.25 per long ton on wrought or manufactured. These rates are increases of 75 cents and $1.75 per ton, respectively, over those in the tariff act of 1913.

An interesting development in the industry is the entrance into the ranks of producers of Illinois and Pennsylvania. Illinois gives promise of becoming an important producer, a brief description of the developments in that state is given in the following extract:†

"The deposit at Caledonia Landing, as the river front at Olmstead is called, belongs to the Midway formation of the Tertiary system. As already stated, it appears as a bluff about 112 ft. high extending along the shore of the river for about 2 miles. * * * The earth is being dug in an open pit, which covers an area of about 2 acres. The overburden of 10 ft. of sand and loam is loosened by shooting and then removed in wheelbarrows. Below this there is a working face of 34 ft., which is the best quality fuller's earth. The earth presents a distinctly jointed structure and is readily dislodged by prying with bars and shooting. Below this face there is 30 ft. of an inferior grade of earth which has only about 80 per cent of the efficiency of the upper portion. The earth thus loosened is loaded into small cars, which are hoisted by cable on an inclined track and dumped into a receiving bin at the factory. As the raw material comes out of the pit it is in the form of large lumps of a dark-brown color having a fair degree of hardness. These are reduced to cubes of 1-in. size by crushing with differential rolls having breaker bars on one roll. These small lumps are fed into a rotary oil-burning direct-flame drier 20 ft. long and 3 ft. in diameter. The maximum temperature reached in this drier is 900 deg. Fahr. The earth passes through this drier in 12 min., and during its travel the water content is decreased to 3 to 5 per cent. This is accompanied by a brisk reduction in the size of the lumps due to the popping caused by the rapid removal of the water content. Further crushing is done in a 'hummer' mill, where the grain is reduced to pass 10 mesh. The pulverized material is elevated and passed over inclined screens which are electrically vibrated. Three grades are separated—the 16-30 mesh, for the bleaching and filtration of mineral oil; the 30-60 mesh, for the same purpose; the 60-300 mesh, for filtering lard, vegetable oils, soap stock, etc. The screened dry material is sacked and is then ready for shipment. It is very hygroscopic and takes up about 12 per cent of water during storage and shipping. * * * The total amount of fuller's earth available is estimated as 4,000,000 tons. The central location of this deposit with reference to the mineral and vegetable oil refineries, its easy accessibility by water and rail, and the great quantity of the raw material will make Illinois an important producer."

FULLER'S EARTH PRODUCED AND MARKETED IN THE UNITED STATES, 1916-1922

Year	Operators reporting sales	Short tons	—Value at mines— Total	Average
1916	10	67,822	$ 706,951	$10.42
1917	11	72,567	772,087	10.64
1918	14	84,468	1,146,354	13.57
1919	10	106,145	1,998,829	18.83
1920	12	128,487	2,506,189	19.51
1921	12	105,609	1,973,848	18.69
1922	15	138,944	2,289,719	16.48

*The statistical data of this report have been prepared by Miss Katrine W. Cottrell, and the table of imports was compiled from the records of the Bureau of Foreign and Domestic Commerce by J. A. Dorsey, of the United States Geological Survey.

†Parmelee, C. W., Fuller's earth deposit at Olmstead, Ill.; Chemical and Metallurgical Engineering, Vol. 26, No. 4, January 25, 1922, p. 177.

Mining and Quarrying Compared by an Engineer Familiar with Both Operations

Part 2 — Terms Used in Mining Translated into Quarry Language—Various Methods of Removing Rock Explained

By J. R. Thoenen, Member A. I. M. E.
Mining Engineer, Sault Ste. Marie, Mich.

BEFORE proceeding to describe some mining methods that have been found adapted to the extraction of limestone it may be well to correlate some of the terms used in mining practice and define them in quarry language.

A *drift* or *crosscut* is a tunnel of small cross section. It is a *drift* when driven parallel to the long axis of the orebody and a *crosscut* when at an angle to that axis or from a shaft to the ore.

A *shaft* is a vertical or inclined hole sunk from the surface through which ore or rock is hoisted or men and supplies are lowered or both. In coal mine practice shafts are at times sunk solely for the purpose of supplying proper ventilation.

A *winze* is a shaft, but sunk from an underground opening and hence it does not reach the surface.

An *adit* is a tunnel driven from the surface into the side of a hill at a flat dip or level.

A *raise* is the reverse of a shaft and is really a tunnel driven at a steep angle above the horizontal and in many cases vertical.

A *stope* is an underground room, chamber, or place where ore or mineral is being extracted.

The *back* is the roof of an underground stope, drift, or chamber.

A *heading* or *face* is that end of a drift, tunnel, or stope which is being driven or advanced.

A miner on entering a quarry tunnel would be very apt to call the advancing face a *breast* or *breast stope*. These terms refer to the method used in driving the tunnels.

Muck to the miner means a pile of broken ore or mineral ready to be sent to the surface. Therefore the "breaker" or shoveler of the quarry becomes a "mucker" to the miner and his shovel a "muck stick."

The term *waste* as used in mines is that rock which holds no value for commercial saving. The waste of the quarry extracting limestone for burning in vertical kilns would then be the spalls as well as poor stone and overburden.

The mining term *shrinkage* is rather loosely used. Rock or ore broken from the solid expands in volume about one-third. This is due of course to the inclusion of voids or air spaces between the individual pieces of broken stone. This property is taken advantage of in a shrinkage stope for the purpose of maintaining a pile of broken ore on which the driller stands, while at the same time one-third of the ground broken can be taken away.

J. R. Thoren, the author of these articles, who is one of the very few mining engineers in the United States who have had experience in both mining and quarrying limestone

An Underhand Stope

An *underhand stope* is one in which the breaking holes are drilled downward vertically or nearly so. There are illustrated various forms of underhand stopes.

A *glory hole* is an underhand stope in which the broken ore or "muck" moves by gravity to a raise or winze and through this is drawn out below through chutes to cars below. The writer once heard this method of mining defined as that in which many men had been inadvertantly sent to "glory." Whether this is the true origin of the name I am unable to state but inasmuch as in the case cited the use was by a lawyer arguing for the prosecution in a compensation case there is at least a doubt of its accuracy.

An *overhand* or *back stope* may be defined as the reverse of an underhand stope and in its use the "back" or roof is broken down.

A *breast stope* is a simple tuunel driven indiscriminately in all directions and with no systematic manner of placing holes for breaking nor regular pillar system.

Room and pillar mining is simply breast stoping systematized. The excavations are made to follow definite prearranged lines, thus blocking out the ground in uniformly sized rooms and pillars.

A *rib* or *chain pillar* (Fig. 3) is one in which a row of pillars are left in a single chain or rib instead of being cut into individual columns.

Block holing is a name applied to secondary blasting of large blocks of stone or ore wherein a small air drill is used to drill a shallow hole in the block.

Squeeze means a cave over a large area.

A *bench* is a step left in blasting vertical holes in an underground stope.

Bootlegs (no alcoholic content) are the bottoms of holes left in a breast or heading by the explosive for one cause or another failing to "pull" the hole to bottom.

The Best Method

The best method of recoving limestone or any other mineral product from its original place in nature is that method, which, will yield a maximum recovery at a minimum cost per ton or per yard, in the best marketable condition, and with the least danger to the men engaged in its extraction.

There are various conditions affecting the method that will be used in any particular place. Owing to these varying conditions one method (whether open pit or underground) that is ideal for one deposit either will be totally unfit for another or will have to be so altered as to lose its resemblance to the original method.

Roof pressure is an indefinite quantity depending on the depth of the seam or strata. In pillar mining in general, an increase in roof pressure requires larger pillars and

smaller openings, this is especially true in thick seams.

Bunting's Rule

D. Bunting in Vol. 4 (1911) of the Translation of the American Institute of Mining and Metallurgical Engineers gives the following formula for use in coal mine practice:

$$yz = 1000x\,(0.70 + 0.30\frac{b}{h})\,b$$

y=depth below surface in feet.
z=distance c-c of rooms, feet.
b=width of pillar, feet.
h=total thickness of seam, feet.
It is assumed that the weight of overlying strata is 144 lb. per cu. ft. and that the safe load on a cube of anthracite is 1000 lb. per sq. in.

Drilling underground preparatory to blasting

However, he says further, "In the application of any formula to the calculation of the size of pillars necessary to resist the pressure of the overlying strata consideration must be given to the nature of the seam and its contiguous strata, and to the dip. Moreover the proper factor of safety varies with local conditions, such as the relative location and extent of workings and the seriousness of possible disturbance to the overlying strata and surface."

The strength of a roof is its power to support itself and its overlying load over mined out areas. A very strong roof transmits the weight to the pillars; its advantage disappears when, with increasing area of workings, the pressure crushes the pillars and causes a squeeze or cave. A roof that will break down and "choke" an *exhausted* room is desirable, as it eases the weight on adjacent pillars. In pillar methods, robbing the pillars is facilitated by a roof that is self-supporting over moderate areas, but which will break square near the working face; this eases the pressure on remaining parts of pillars and lessens the chance of a squeeze.

When robbing pillars, the removal of a single pillar may so shift the weight, where inadequate columns have been left, that the adjacent pillars will crush, causing a general squeeze.

The character of the floor also influences the size of the openings. A soft bottom or floor such as shale requires narrow openings and large pillars. The pressure on the pillars tends to force them into the floor, and causes the floor to bulge; this is known as "heave" or "heaving bottom."

(To be continued)

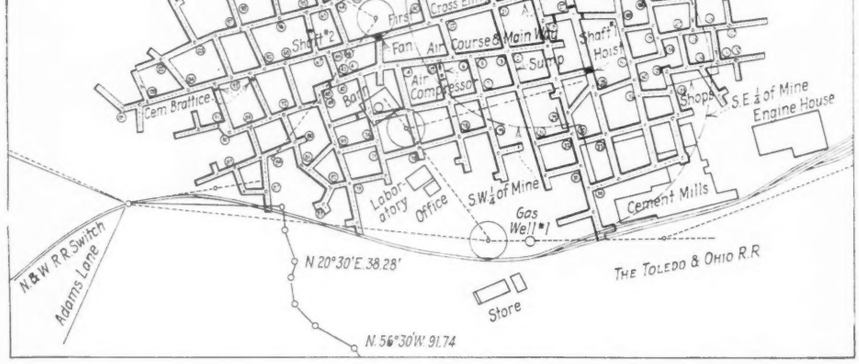
Limestone Mining at Bellefonte, Pennsylvania

ADJACENT to the present mine shaft of the American Lime and Stone Co., Bellefonte, Penn., there are two quarries, known as No. 18 and No. 24, that have been operated in the past as open quarries.

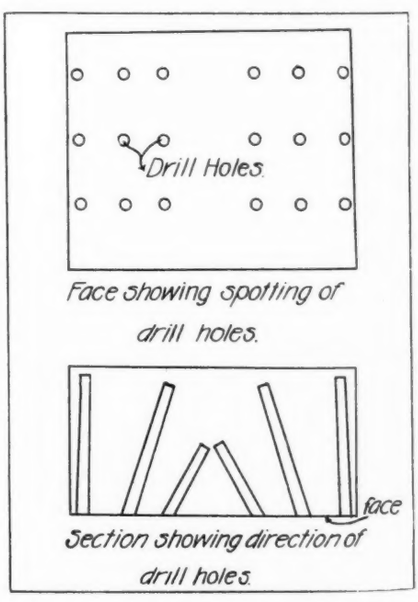
It has been decided recently that conditions were favorable toward turning these quarries into open chamber mines so as to provide a back log in case of break down in the main mine and also to provide for increased capacity to take care of peak demands beyond the capacity of the main mine.

Progress has been made to the point where No. 24 is now open and producing mine stone and No. 18 will follow shortly. Under normal operating conditions these two additional mines can produce 300 tons of mine stone in one shift and by doubling the shifts they can without difficulty economically produce 600 tons of stone per day. The normal output of the main mine is 1000 tons of mine stone per day and this can be approximately doubled by working day and night shifts. This arrangement makes a very flexible operating condition, particularly since all three mines are on the same track system and operated under one overhead.

The result of this will be to greatly increase the output of "Bell-Mine" products.



Plan of a limestone mine in Ohio at a cement plant, showing the tunnels and cross cuts in relation to the plant above. The limestone is to be removed, or has been removed, from the areas blocked out in this way



Pointing the holes in a tunnel. Note the inclined direction of the "cut" holes that blow out a conical cavity into which the other holes "break"

Hydraulic Cements by Additions of Certain Minerals to Lime

German Experiments and Research During the Last Few Years Outlined

By Dr. C. R. Platzmann
Berlin, Germany
Written especially for Rock Products—Translated from the German by R. W. Scherer, Milwaukee, Wis.

THE question of cement substitutes is by no means a new one, nor did it originate in the economical difficulties of the post-war period in Europe, when many users were no longer able to pay high prices, but resulted from a demand by the building trades manifested before 1914 for a cement that possessed most of the attributes of the standard portland cement, but which would, in the first place be considerably cheaper and of which for certain works, lower standards would be exacted than are deemed necessary in important concrete and reinforced-concrete structures.

Numerous Fakes

During the acute and continued shortage of cement since the war a number of spurious products found a market and it was these so-called "Extra-Limes" that have shattered the faith of consumers in all substitutes. Examinations and tests of these products which were offered under such high sounding names as "Vulcan" cement, "Montan" cement, "fire-resisting," or "fireproof" cement, etc., revealed the fact that they were anything but hydraulic binders. The "fireproof" and "Vulcan" kinds—known to the industry for years—possessed no hydraulic properties whatever, did not harden in either air or water and showed tensile and compressive strengths that were inadequate for any purpose, or no strength at all.

In one especially bold case the manufacturer of what was advertised as "Trachytia" cement dared to forge the official certificate of the findings of the National Bureau for Testing Materials and to use this forged document to market his valueless product. Another brand coming from Aussig with the recommendation of the Technical High School of Prague proved a very inferior article, not to be compared, in any way, with portland cement. In 1:3 mortar mixtures using one part of this "cementin" to three parts of standard sand (Austrain standard) tensile a strength of 4.96 kg. per sq. cm. (65.5 lb. per sq. in.) was attained in seven days (water storage) and 6.90 kgm. (96.5 lb.) in 28 days. The Austrain standard for cement, that still applies in Czecho-Slovakia, specifies minimum tensile strength of 12 kg. (168 lb.) in seven days and 25 kg. (350 lb.) in 28 days. In compressive strength "Cementin" showed 58.1 kg. (814 lb.), while 250 kg. (3500 lb.) is the minimum demanded of standard cement, a minimum which every portland cement exceeds. When it is considered that the Austrain standard sand, on account of its grading, itself contributes toward a high test, the value of "Cementin" can be readily determined from the data given.

TABLE No. 2—TESTS OF "LILIKALIT"

Water Stored	3 days	7 days	28 days	90 days
Tensile strength	11.6 (162)	15.5 (217)	26.9 (377)	36.3 (493)
Compressive	132 (1848)	184 (2570)	231 (3230)	323 (4520)
Transverse	.....	16 (224)	31 (434)	.....
Air Stored				
Tensile strength	.....	19.5 (273)	31.4 (438)	.....
Compressive	.....	336 (4700)	359 (5025)	.....
Transverse	.....	31 (434)	.....	.....
Combined Storage				
6 days under water and		21 days in air		83 days in air
Tensile strength		39.6 (498)		41.5 (581)
Compressive		336 (4700)		359 (5025)
Transverse strength		31 (434)		.....

Cement Substitutes That Are Not Fakes

In contrast to such fakes there are the reports of the Associations of Portland Cement Manufacturers of 1912-'14 on a cement produced by the Meteor Works in Geseke in Westphalia. A dispute arose in regard to this brand known as "Meteor-Extra" as it was advertised as a cement substitute and was awarded a contract by one of the railroads, competing against portland and iron-portland cement. The "Meteor" people were sued for unfair competition, but the matter ended by the portland mills buying up the entire plant and the manufacture was discontinued for obvious reasons. The (German) Portland Cement Association had bought up samples of Meteor in 1912 as offered on the market and subjected them to thorough examinations. These tests undertaken primarily to expose the inferiority of this brand as compared with portland cement were doubtless reliable and gave the following result in kilograms per square centimeter: (Table No. 1.)

It is evident from these results that already before the war hydraulic binders were produced that approached very closely the strength of portland since all the standard cements tested during the year 1921 showed the following averages:

Tensile strength 1:3 mixture

	Kg. per sq. cm.	Lbs. per sq. in.
7 days water storage	21.4	299
28 days water storage	27.5	385
28 days comb'd hard'g	41.0	574

Compressive strength 1:3 mixture

	Kg. per sq. cm.	Lbs. per sq. in.
7 days water storage	234	3275
28 days water storage	335	4690
28 combined storage	399	5580

TABLE No. 1—TESTS OF CEMENT SUBSTITUTES OF GENUINE MERIT

Mixture	Tensile Strength kg. per sq. cm. (lb. per sq. in.)		Compressive Strength kg. per sq. cm. (lb. per sq. in.)	
Stored in Water	7 Days	28 Days	7 Days	28 Days
1:3	24.4 (342)	36.7 (514)	273 (3820)	301 (4220)
1:5	15 (210)	21.3 (298)	128 (1790)	179 (2510)
1:7	11.1 (155)	15.5 (217)	70 (980)	98 (1370)
Combined Curing				
1:3		38.5 (538)		448 (6280)
1:5		26.8 (375)		231 (3240)
1:7		18.4 (258)		141 (1975)
1:10		15.5 (217)		80 (1120)
	SAMPLE No. 2			
Mixture	Tensile Strength		Compressive Strength	
Stored in Water	7 Days	28 Days	7 Days	28 Days
1:3	27 (378)	33.7 (472)	287 (4010)	396 (5550)
1:5	14.6 (204)	19.7 (276)	126 (1765)	164 (2290)
1:7	10.5 (147)	14.7 (206)	67 (938)	92 (1290)
1:10	8.1 (112)	9.9 (139)	42 (588)	51 (714)
Combined Curing				
1:3		40.9 (572)		442 (6180)
1:5		25.6 (358)		205 (2870)
1:7		17.3 (242)		127 (1775)
1:10		13.6 (190)		79 (1105)

Furthermore the "Sachsisch-Boehmische" Portland Cement Works at Tschechkowitz, Lobositz Czecho-Slovakia produce a cement-like binder which is guaranteed to attain the strength demanded of the standard product and which carries the trade name of "Silikalit."

The chemical composition of the brand is as follows:

	By the German Tech. H. S., Prague	Bohemian Tech. H. S., Prague	My Own Analysis
Loss on Ignition	5.92%	6.11%	3.15%
Silica SiO_2	22.46	27.51	22.93
Alum & Iron Oxyds	11.39	9.00	10.33
Lime	56.26	52.50	57.64
Magnesia	1.37	1.72	0.98
SO_3	2.74	3.47	3.65
Alkalies	0.00	0.00	1.20

The following tables show the other properties of "Silikalit."

Tests by the National Bureau for Testing Materials, Dresden: Tensile strength 1:3 mixture. (Average of ten tests)

	Kg. per sq. cm.	Lbs. per sq. in.
7 days water storage	20.4	285
28 days water storage	27.2	381
28 days comb'd st'ge	33.7	472

Compressive strength 1:3 mixture, averages,

	Kg. per sq. cm.	Lbs. per sq. in.
7 days water storage	193	2700
28 days water storage	281	3930
28 days comb'd curing	319	4460

The above tests date back to 1914. The results of a series carried out in 1920 by the same institution on the same brand show virtually the same results.

The Bohemian Technical High School at Bruenn in tests on "Lilikalit" in 1921 found the following results: (Table No. 2 on preceding page.)

The tests for transverse strength were conducted on prisms (dimensions 4x4x30.2 cm.) in 1:3 mixture with 11% of water. The mortar was moderately tamped with due regard to uniformity in the handling of all materials. The prisms were permitted to remain in forms for 24 hr. and then stored as scheduled.

The boiling test, shrinkage test, etc., proved satisfactory in all samples and by all authorities.

My own examinations showed (meshes per sq. cm.):

Sieve test—Held on 900-mesh screen: 2.2% (about 80-mesh in American terms)
Sieve test—Held on 4900-mesh screen: 13.2% (about 180-mesh in American terms)

Initial set begins after 5½ hr. and ends after 30 hr. Compressive strength:

	Kg. per sq. cm.	Lbs. per sq. in.
7 days air stored	96	1342
28 days air stored	180	2520
28 days comb'd storage	242	3390
90 days comb'd storage	263	3680

"Silikalit" is produced from hydraulic lime and phonolit, an igneous rock of recent origin. To control the initial set a small percentage of gypsum is ground into the mixture. The specific gravity of "Silikalit" as well as "Meteor Extra" is somewhat less than that of portland cement and also requires more water in mixing. Their preparation and properties were tested in detail because in both cases, as in all cement-like binders, hydraulic lime is the principal ingredient to which are added substances to increase the hardness and setting.

Hydraulic Lime the Basis

Hydraulic lime, as is well known, is produced from marl or silicious lime by burning below the sintering temperature, then hydrating and powdering. Hydraulic limes are distinguished as weakly or strongly hydraulic and their composition varies between the following limits:

	CaO (MgO)	Al_2O_3 SiO_2 Fe_2O_3	Water
Weakly Hydraulic	85-90%	10-15%	20-24%
Strongly Hydraulic	65-85%	15-35%	17-22%

The raw material is subjected to a temperature of 900 to 1000 deg. Centigrade without sintering taking place. The process in burning is the following: After the separation of the CO_2 and while the material is in a solid state a reaction takes place between the lime on the one hand and the silica, aluminum and iron oxide on the other hand, by which there is an increase of substances soluble in hydrochloric acid (HC1). Therefore, the process of hardening in hydraulic limes is not due to a recarbonizing of the lime by absorption of carbonic acid gas from the atmosphere as in quick limes, but depends to a considerable extent on a conversion to silicates of that part of the lime that is soluble in HC1. The strengths attained are for this reason alone, considerably higher than can be attained with quick lime in the same periods. The average mortar tests with hydraulic lime after 72 hr. in moist air, the balance of the time in water are as follows:

	Air-stored	Water stored	Combined storage
85% Lime 15% addition	32 (448)	70 (980)	81 (1135)
80% Lime 20% addition	40 (560)	86 (1204)	97 (1359)
75% Lime 25% addition	68 (952)	88 (1231)	105 (1470)

Silica Adds Strength-Giving Properties

It is evident from this series that the additions of the SiO_2 tends greatly to increase the strength. The figures would have been considerably higher if it had been possible to mix the materials mechanically instead of by hand. Dr. Kellig, who used machine mixing, obtained higher figures: (Table No. 4.)

The chemical composition of the admixtures were as follows:

	Silicates	Phonolith
Silica, SiO_2	64.00%	56.72%
Al_2O_3 & Fe_2O_3	17.22	24.86
Lime Ca.	0.55	2.36
Magnesium Mg.	.58	Trace
SO_3	4.38	.....
Alkalies	0.90	12.49
Loss on Ignition	12.37	3.75
	100.00%	100.00%

From the results enumerated above it is clear that with good hydraulic limes such as occur in many localities in Europe, the admixture of silicate, Phonolith or other igneous rock formations, and with careful preparation, cements can be obtained that approach very closely in strength to portland cement. There is no doubt that such extra limes, very easily produced, are suitable for a variety of purposes for which the more expensive portland cement is now used. Production of such extra-limes on a large scale is a question of markets and materials at hand near these markets. The best materials and the best possible mixture of the available materials can be determined in short order and a dependable product made.

TABLE No. 3—TESTS OF HYDRAULIC LIME

	7 days	28 days	90 days	180 days	365 days
Tensile strength	7 (98)	13 (182)	18 (252)	25 (350)	27 (378)
Compressive	27 (378)	54 (756)	94 (1318)	126 (1764)	153 (2140)

Pulverized Minerals Added

The above not inconsiderable strengths are materially increased if suitable hydraulic substances, which may however have no hardening properties whatever in themselves, are added to increase the percentage of the parts soluble in hydrochloric acid. As such materials we recognize certain clinkers, phonolit, trass, puzzolano and all igneous rocks of a similar nature. Due to the fact that they have all been subjected to high temperatures these minerals have undergone a process similar to the laboratory process of separating silica: They are all distinguished by a high percentage of soluble silica, aluminum and iron oxides, available for converting superfluous lime to silicates.

During 1919 and 1920 the writer, partly in conjunction with Dr. F. Kellig, undertook a long series of laboratory tests, with the object of producing from hydraulic lime and the additions above mentioned, a cement-like binder that would meet all requirements. As only lime from Rudersdorf was available, one which is not strongly hydraulic, no such high tests were attained as with "Silikalit" or "Meteor Extra." However the following results were obtained:

TABLE No. 4—TESTS OF HYDRAULIC LIME WITH ADDED INGREDIENTS

	7 days		28 days	
	Air	Water	Air	Water
Lime only	11 (154)	18 (252)	.....	.....
Lime with 25% addition	61 (854)	70 (980)	140 (1960)	148 (2070)
Lime with 50% addition	50 (699)	30 (420)	167 (2340)	105 (1470)

Detonators

IN blasting, the explosion of the high explosive charge is initiated by means of a detonator. Consequently the successful operation of the whole system is, from the beginning, dependent upon the suitability and efficiency of the detonator used. The results of this investigation are given in Serial 2558, "Methods of testing detonators," which may be obtained from the Bureau of Mines, Washington, D. C.

Production of Lime from Small Sizes of Stone*

All Attempts with Shaft Kilns Thus Far Unsuccessful—Rotary Kiln Practice Discussed

By W. M. Myers

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MANY EXPERIMENTS have been made attempting to calcine small stone in the shaft kiln, but to date none of them have shown any great promise. If small stone is introduced into the kiln in appreciable quantity, a marked retardation in draft may make successful operation of the kiln impossible.

The actual combustion chamber of the kiln in which the gases burn, whether from a wood or coal fire, or a gas producer, is the void space between the fragments of stone. Theoretically this void space is the same whether the charge in the kiln be large or small stone, provided the stone be sized so that all the fragments possess the same dimensions. Actual experiment has shown that this theory holds true for limestone which has been carefully screened, a charge of 2-in. stone possesses practically the same void space as the one-man material. When different sizes of stone are charged void space is greatly lessened, as the small stone fills the spaces between the larger material.

The retardation in draft is due principally to the frictional resistance of air passing over the stone and to the repeated change in direction of the currents of air passing through the charge. When either a cube or sphere is divided into smaller cubes or spheres whose diameters are one-half that of the original, the surface is doubled. This holds true approximately for irregular-shaped fragments, so that the surface exposure of a charge of 3½-in. stone is many times that of the one-man material, and the frictional resistance of the gases passing through this stone is correspondingly increased. The channels for the passage of gas between the stones become small, intricate and exceedingly tortuous, and the constant change in direction of the air currents greatly increases the retardation. Experiments at the plant of the Rockland-Rockport Lime Corp., Rockland, Me., demonstrated that the possibilities of burning closely-sized small stone in the shaft kiln are slight unless the design and operation of the kiln be radically changed.

Whether shaft kilns could be so altered as to make this possible can only be determined by trial. It is evident that a good draft is essential for satisfactory operation of the shaft kiln. This draft must be sufficient to overcome all retarding agencies, draw the gases from the fuel into the void space between the fragments of stone, and remove the carbon dioxide as fast as it is evolved. Even if these conditions were fulfilled, some doubt still exists as to the possibilities of successful combustion. Although the total void space in a charge of small stone would be the same as in the larger material, the individual voids between the fragments of stone would be much smaller, and whether these small combustion chambers would permit the fuel gases to burn satisfactorily can only be determined by experiment.

The draft could be augmented by a combination of interior inlets for gas and mechanical exhausts for removing the products of combustion. If gas were supplied by means of interior inlets at different levels in the kiln, part of the resistance to the draft could be avoided, and sufficient fuel for combustion introduced into the interior of the charge. The introduction of flues at different levels into the upper portion of the kiln, so arranged as to project directly into the charge of small stone, should increase the draft considerably, particularly if connected with a powerful exhaust fan.

Rotary Kiln Practice

The dimensions of rotary kilns used in the manufacture of lime have varied from 50 to 175 ft. in length with corresponding diameters, varying from 5 to 8 ft. The use of small kilns has not been particularly satisfactory as they have involved more of an investment than was warranted by the tonnage of lime produced, also due to their short length the fuel ratio (pounds of lime per pound of fuel) tended to be low, resulting in an additional increase in the cost of lime production.

Most of the rotary kilns in successful operation today are from 135 to 150 ft. long with an inside diameter of 6 or 6½ ft. These kilns will produce 80 to 125 tons of lime a day with a corresponding consumption of limestone nearly double these figures. It is apparent that such a tonnage of small stone could not be furnished by any minor operation.

Rotary kilns have been fired with oil, powdered coal and producer gas. Oil tends to produce a short flame which concentrates the heat at one point which is not very desirable. Its use is further limited to localities where it may be procured cheaply with the result that it has not been used very extensively. Powdered coal, while a very desirable fuel in many ways, possesses one undesirable feature for the manufacture of lime in that the ash is partly deposited and intimately mixed with the lime in the kiln. This has been overcome by passing the lime after hydration through an air separator of the Raymond type.

Producer gas is the fuel most commonly used in rotary kilns at present. This is due to its economy, ease of operation and control, and the long flame suitable for the calcination of limestone. The extensive use of producer gas in other industries has furnished a great deal of information concerning its manufacture and employment which facilitated its use in the lime industry.

In general, in rotary kilns fired with producer gas the fuel ratio at present lies between 2.75 and 3.33 lb. of lime per pound of coal.

Stone, varying in size from dust to over 2 in. in diameter has been burned in the rotary kiln. Some difference of opinion exists as to what size is best. Most of the stone calcined today has a diameter between ½ and 1½ in. which appears to be the most satisfactory size. It is important that the stone be sized to fairly close limits, preferably the ratio of the largest stone to the smallest should not exceed 2 to 1.

The physical properties of lime produced in the rotary kiln display considerable differences from lime made from the same stone in the shaft kiln. The most pronounced difference is the extreme rapidity with which lime from the rotary kiln will slake. This is probably due to its porous nature. Calcination of stone in the shaft kiln is a slow process, the total time varying from 24 to 27 hr. During this period the stone is gradually heated up to the calcination point, the whole process being more or less slow and uniform.

In the rotary kiln the total time between the introduction of the stone to the kiln and the discharge of the lime seldom exceeds 3 hr. The stone is rapidly brought to high temperatures, which swiftly expels the carbon dioxide. The sudden removal of the carbon dioxide seems to leave the lime in a more porous condition than the slowly calcined lime of the shaft kiln. Some difference in the sand carrying capacity and also plasticity of lime from the rotary and shaft kilns has been noted.

*Abstract of Reports of Investigations, Bureau of Mines, Serial No. 2596, April, 1924.

Hints and Helps for Superintendents

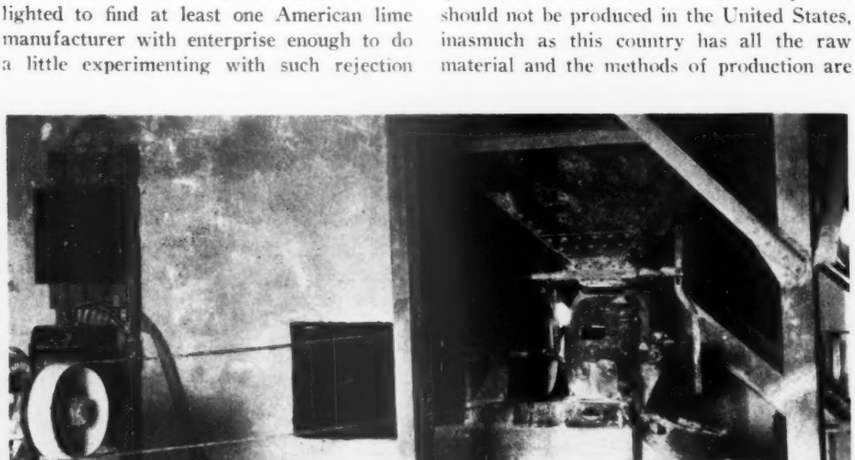
A Special Cement from Hydrated Lime Rejects

ROCK PRODUCTS has called attention editorially more than once to the fact that French lime manufacturers considered the silicious culls, hard-burned clinker, etc., from their lime kilns as the most valuable product. The hard-burned culls and clinkers formed by chemical union of the lime with its impurities such as silica, alumina and iron are none other than the calcium silicates, aluminates, etc., which are the basis of nearly all hydraulic cements.

With this in mind the editors are delighted to find at least one American lime manufacturer with enterprise enough to do a little experimenting with such rejection material, and to learn that his experiments have led to success in finding that these rejections, pulverized, make a superior mortar material—either hydraulic lime, or a mixture of hydrated lime and natural cement. The practice of grinding the rejections of a hydrate mill and returning this pulverized material to the hydrate is of course quite general practice today, where the hydrate is to be sold for other than chemical uses. But in the case described below the culls and clinkers are pulverized for a *special product* even more valuable, potentially, than the hydrate.

L. J. Backus, manager of the Ladd Lime and Stone Co., Cartersville, Ga., is the man who has done some experimenting with the rejects from his hydrating plant and found that they possessed valuable qualities when finely ground. Accordingly a Sturtevant rock-emery mill was installed and grinding has been begun on a commercial scale. The ground product contains 80% Ca $(OH)_2$ which would class it with the hydraulic limes or perhaps a mixture of hydrated lime and ground *grappiers*. At all events it has been found an exceptionally good cement for the finer kinds of mason's work and one which ought to meet a ready market, and for which Mr. Backus expects to make a market.

A considerable tonnage of hydraulic lime and *grappier* cement is imported into this country annually because of its non-staining qualities. There is no reason why this should not be produced in the United States, inasmuch as this country has all the raw material and the methods of production are the same as are employed in the ordinary manufacture of lime.



Rock emery mill for grinding tailings from air-separating system

An Air Storage Tank Explosion

By F. J. MacDonald, Cobleskill, N. Y.

ONE spring as the weather warmed up we were surprised by a loud explosion at or near the quarry. No large blasts were ready and we were at a loss to know what could cause such an unusual noise. Some thought the dinkey had blown up.

An investigation proved that surely something had happened. The large 5-in. vertical pipe with elbow and 10 ft. of horizontal pipe was blown at least 40 ft. out over the dinkey tracks, and the end of our compressed-air tank, that was concave or cup-shaped (bulged in) and the rivets around the outside, was blown in a convex form. Fortunately no one was injured. The tank was afterwards oxy-acetylene welded and is still in use.

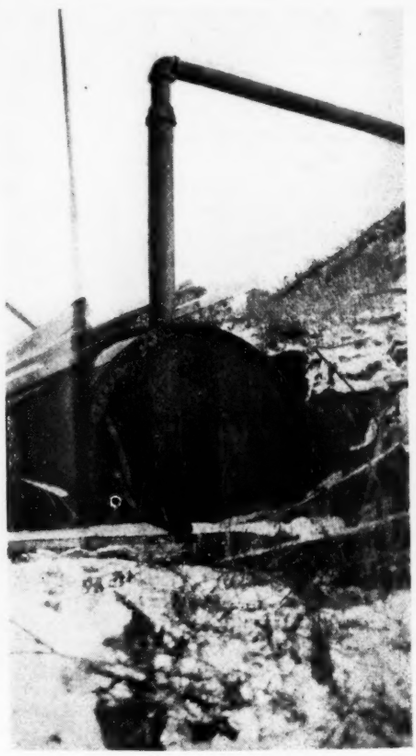
This tank had been neglected for a time. The air-compressor operator was supposed to drain it every day (at the bottom) of all the excess of oil and water.

I will attempt to explain technically the cause of this explosion. I may not be an authority on the subject, but I will give my opinion, trusting it will not conflict with other opinions. This explosion was not caused by an excess of air pressure (as some tried to make me believe) or any weakness of the tank.

It is well known that fumes or gases from gasoline or kerosene are explosive when mixed with air; also from machine oil when heated. Some of the high compression gas engines will run on machine oil when heated.

For a long time before I came on the job an excessive amount of a light or white oil had been used in the air compressor; and the tank and air line were well saturated with this oil. The day of the explosion was a bright sunshiny day, and the tank was not protected from the sun's rays.

It is best or advisable to have tanks covered or in the shade. In many garages the



Compressed air tank that may let go most any hot summer day

storage tanks are close to where the men have to work and I know of a few explosions. In many places a sign reads: "Safety First." Yet no thought is given the air tank. Some will say tank explosions are not common. I have no statistics of their frequency. But the fact still remains that they do happen; always when least expected. Tank explosions can usually be traced to carelessness or neglect and I do not care to work close by one under pressure unless I know it is given proper attention.

The attendant often pours too much oil in the air compressor, which works by the rings (into the air line). Some compressors are not fitted with an automatic switch or safety valve, and the pressure runs too high; and the drain valve is neglected, or none is attached. If the "Safety First" sign is to be heeded the air tank should be given due consideration. An excess of oil in an air compressor is to be condemned, especially in large machines. Many are fitted with graphite feeders.

It was well for us at the quarry that we made a change to the proper oil for our lubrication. A high fire test, or first-class gas-engine oil was used and I happened around one day and found the attendant had forgotten his pump or water circulation and I found the compressor ready to burn up (if such could be). The pipe line, 10 ft from the compressor, was hot enough to charr the boards 2 in. from the pipe, and the machine was smoking so bad one could hardly enter the room. If the proper oil had not been used it would have meant a set piston, scored cylinder and perhaps a wrecked machine. I have in mind such cases.

Of course it is known that compressing air heats it (sometimes that is why your car starts after you crank it long enough). Simply compressing air is what nearly burned up this compressor I have told you about. Just the right mixture of air and oil vapor; perhaps a high pressure, and under just the right conditions, the charge is ignited and the tank explodes. I have already said enough for thoughtful readers to heed. The careless are hard to advise.

Belt Dressing

WITH regard to belt dressing, don't use it if you can help it and unless the belt maker advises it. It is a better policy to put a wider belt on, if this can be done, even if it means the putting in of a wider driving pulley.

A really humorous case came under the writer's notice illustrating the use of belt dressing. A complaint came along regarding a driving belt that the user alleged was not of sufficient dimension for driving a heavy crushing machine. On seeing the belt at work it looked as if the belt was about a quarter of an inch away from the pulley rim all around. The first remote suspicion that suggested itself to the investigator was centrifugal force, but on looking at the pulley face he saw a collection of Stockholm tar, etc., all round the pulley in a streak about 3 in. wide. This 3 in. was the only contact the belt was making with the pulley face out of a width of about 12 in.

A narrower belt at the same quarry had a layer of tar a ¼-in. thick over its whole face, and still the belt came off. But it was not the fault of the belt or the pulley or the tar, but of the man who set the shaft so badly out of line.—*Stone Trades Journal.*

Baffle to break up lumps of clay

Discharge pipe with baffle to break up lumps of clay

A Baffle Which Breaks Lumps of Clay

THE two pictures accompanying this note show the end of the discharge pipe of the dredge of the Wolf River Sand Co. at Memphis, Tenn. This dredge does not pump directly to screens but to the shore of an old, worked-out pit. The gravel slides off the shore into the pit from which it is reclaimed by a cableway dragline. The purpose of this method of working is to give an additional wash to the material which is mined without stripping and which consequently contains considerable clay and loam.

Much of the clay is in hard lumps of considerable size and it is to deal with these that the baffle shown has been devised. There is a central plate 2 ft. in diameter against which the discharge strikes, and two concentric rings. The larger lumps of clay are caught by these rings and held by them until disintegrated by the pounding of the stream.

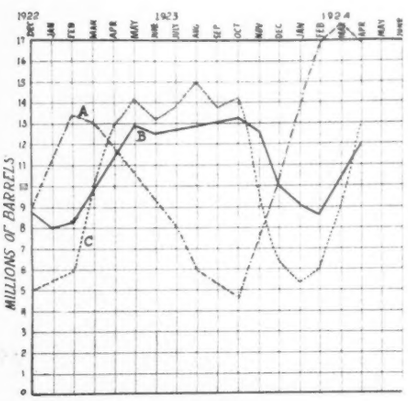
The arrangement appears rather crude but is effective. Since it has been put on the discharge pipe there has been a notable decrease in the number of clay balls that had to be dealt with in the washing and screening plant.

The obects seen in the picture of the pipe and baffles, in which the lower part of the rings are buried, are not stones but lumps of clay.

Portland Cement Output in April, 1924

THE STATISTICS shown in the following tables issued by the Department of the Interior, and prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for April, 1924, were made necessary by the lack of returns from two plants. The April production shows marked increase over March but shipments increased at a much higher rate, thus reducing stocks by more than 1,000,000 bbl., or about 6%. The seasonal increase in shipments has reversed the unprecedented growth of stocks shown during the preceding months.

Stocks of clinker, or unground cement, at the mills at the end of April, 1924, amounted to about 8,560,000 bbl., compared with 8,271,000 bbl. (revised) at the beginning of the month.



Portland cement production, stocks and shipments. (A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) shipments of finished portland cement from factories

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN APRIL, 1923 AND 1924, AND STOCKS IN MARCH, 1924, IN BARRELS

Commercial District	Production—April— 1923	1924	Shipments—April— 1923	1924	Stocks at end of April— 1923*	1924	Stocks at end of March, 1924*
East. Pa., N.J., Md.	2,996,000	3,024,000	3,554,000	3,361,000	3,778,000	4,392,000	4,729,000
New York	514,000	656,000	624,000	613,000	804,000	1,301,000	1,258,000
Ohio, W. Pa., W.Va.	1,145,000	981,000	1,247,000	999,000	1,042,000	1,918,000	1,936,000
Michigan	551,000	615,000	598,000	679,000	640,000	888,000	952,000
Ill., Ind., Ky.	1,924,000	1,723,000	2,405,000	1,973,000	1,301,000	2,703,000	2,954,000
Va., Tenn., Ala., Ga.	573,000	886,000	635,000	933,000	213,000	750,000	797,000
East. Mo., Ia., Minn.	1,018,000	982,000	1,197,000	1,251,000	1,694,000	2,519,000	2,788,000
West. Mo., Neb., Kan., Okla.	855,000	895,000	940,000	1,036,000	883,000	1,124,000	1,265,000
Texas	360,000	404,000	347,000	463,000	284,000	337,000	396,000
Colo., Utah	245,000	204,000	218,000	219,000	163,000	196,000	211,000
California	917,000	1,017,000	924,000	970,000	139,000	418,000	370,000
Ore., Wash., Mont.	261,000	339,000	265,000	274,000	522,000	598,000	533,000
	11,359,000	11,726,000	12,954,000	12,771,000	11,463,000	17,144,000	18,189,000

*Revised.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS

Month	Production 1923	1924	Shipments 1923	1924	Stocks at end of month 1923*	1924
January	*7,990,000	8,788,000	*5,628,000	5,210,000	11,477,000	*14,155,000
February	*8,210,000	8,588,000	*6,090,000	5,933,000	13,596,000	*16,815,000
March	9,880,000	10,370,000	10,326,000	8,995,000	13,045,000	*18,189,000
First quarter	26,080,000	27,746,000	22,044,000	20,138,000	.....	.....
April	11,359,000	11,726,000	12,954,000	12,771,000	11,463,000	17,144,000
May	12,910,000	.....	14,257,000	.....	10,144,000	.....
June	12,382,000	.....	13,307,000	.....	9,168,000	.....
Second quarter	36,651,000	.....	40,518,000	.....	.....	.....
July	12,620,000	.....	13,712,000	.....	8,081,000	.....
August	12,967,000	.....	14,971,000	.....	6,080,000	.....
September	13,109,000	.....	13,698,000	.....	5,533,000	.....
Third quarter	38,696,000	.....	42,381,000	.....	.....	.....
October	13,350,000	.....	14,285,000	.....	4,612,000	.....
November	12,603,000	.....	10,251,000	.....	6,991,000	.....
December	9,997,000	.....	6,408,000	.....	10,575,000	.....
Fourth quarter	35,950,000	.....	30,944,000	.....	.....	.....
	137,377,000	.....	135,887,000	.....	.....	.....

*Revised.

An Interesting Fairy Tale

THE fact that the shell deposits of the lower bay can be converted into cement has led one of the most gigantic manufacturing plants in California to locate here at Redwood City, yet the discovery of this fact was the result of the observation of one man, and that man not connected with the cement industry. Several years ago George A. Merrill of Redwood City, while watching a dredger at work excavating shells, began to speculate if it would not be possible to make these shells take the place of the lime which was necessary to the manufacture of cement and which was expensive to mine and calcine.

Merrill asked Bert Werder to bring a few sacks of shells into town, and when they were secured, he and Werder set up an old coffee mill and proceeded to grind the shells as fine as the coffee mill would grind them. They were afterwards pounded to a fine powder in a mortar, and then sent to Prof. Tibbitts, chemist of the Lick-Wilmerding school. Tibbitts experimented with the shells and finally decided that they were good for making cement.

The news was received with joy by the cement manufacturers, who were desirous of securing cheap lime, and the discovery has resulted in the commencement of the two million dollar plant on the marsh.—Redwood City (Calif.) *Times-Gazette*.

California Fortunes Used to Be Made in Gold—Now It Is Limestone

THE following newspaper story is interesting to us (and may be to you) because it illustrates how the *value* of limestone deposits is making an impression upon newspaper writers and the general public. The Oakland (Calif.) *Post-Enquirer* says:

Through the discovery of a huge lime deposit on what long was deemed almost a worthless piece of land left by Albert J. Caswell, who died in Oakland more than two years ago, an aged, poverty-stricken brother has become heir to a fortune of $125,000.

This was disclosed today when Superior Judge George Samuels denied the petition of the Los Gatos Lime Co. to compel Public Administrator Albert E. Hill to deed the property to it by virtue of an agreement with Caswell.

Caswell, who died in December, 1921, owned 160 acres of hilly, apparently barren land near Los Gatos. When he died it was not known officially that the lime deposit existed, as Caswell had not generally revealed this, though he had arranged with others to develop it, and Hill reported the land to be worth not over $600.

Caswell was a widower and had no children. His only relative was a brother, William L. Caswell, 76, who for years had been residing at Newmarket, N. H., where he eked out an existence in the fishing industry. Attorney Arthur L. Churchill is here from that city representing his interests.

A Correction

SIR—The writer, who represents the Koppel Industrial Car and Equipment Co. of Koppel, Penn., on the West Coast, wishes to call to your attention an error in the article "Sand and Gravel Industry of Los Angeles," published in your issue of April 19.

On pages 42 and 43 this article, in discussing the equipment used by the Big Tejunga Rock and Gravel Co. of southern California, mentions that the material excavated in the present pit is hauled up a double-track incline in 4½-yd. Western or contractors type dump cars. This is indeed incorrect, as the car equipment used consists entirely of Koppel 4-yd. capacity contractors' type dump cars, and not Western.

(Signed) HARRY C. KROFT,
Edward R. Bacon Co.,
Los Angeles, Calif.

May 2, 1924.

Editorial Comment

Cement Import Problem

Probably many cement manufacturers with plants well in the interior and having little or no market in seacoast localities do not yet realize the seriousness of the cement import problem and its relation to the cement industry as a whole. During March, according to figures of the United States Department of Commerce, approximately 160,000 bbl. of portland cement mere imported. This is equivalent to the monthly outputs of two good sized American portland cement mills. Nearly all seacoast markets are affected, and since manufacturers near the coast who would normally supply this cement must seek markets elsewhere, it is only a question of time and a little surplus production before even the interior market conditions will be seriously affected.

No Let-Up in Rock Products

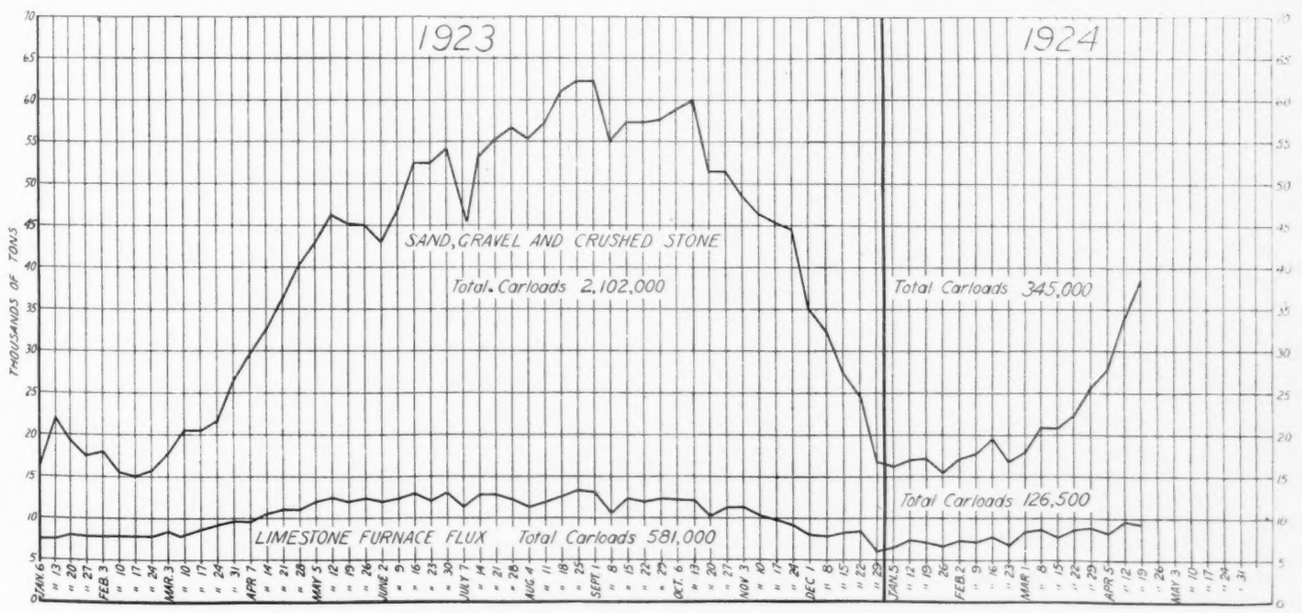
In spite of the fact that surplus freight cars are piling up, and that there are rumors of industrial slowing-up, there is not the slightest evidence that the rock products industry will not enjoy an increase of business over last year. Car loadings of sand, gravel and stone to April 19 show a higher point on the curve below than for the same date a year ago. It is true that construction in certain lines—namely housing and commercial building—is slackening, but industrial, municipal and public-utility construction evidently will reach large proportions this year.

Limes and Cements

After many years groping about in the dark while other industries were making great strides in the application of chemical light and knowledge to their problems, the cement and lime industries are getting ready to pick up the torch and join the procession of progress. The May 3 issue of Rock Products contained an announcement of much more than ordinary interest and significance to the industry—the inauguration of a thorough-going study and research into the physical and chemical constitution and properties of portland cement by the United States Bureau of Standards in cooperation with the Portland Cement Association and other interested parties.

The article of Dr. Platzmann, one of the foremost authorities in the world on portland cement, is particularly significant because it brings out what we have long suspected must be possible— i. e., the combination of lime and silica and alumina to make a hydraulic cement without previous sintering of the silica or alumina —at least not sintering them in the kiln since nature has already done so in the case of common trap rocks, and other rocks of igneous origin.

There are some people who suspect that about all calcining cement slurry does is to make a particularly active form of lime, which upon hydration combines with the alumina and silica, with which it is most intimately mixed, to form the hydrous silicates and aluminates of lime, which are the binding material in concretes. It is time to find out some things.



Car loadings of sand, gravel, and crushed stone based on statistics of the Car Service Division of the American Railway Association—Loading of crushed stone, sand, and gravel for week ending April 26 (received too late to plat) was 42024 cars, which is about 5% above the same week a year ago

Analysis of the Agricultural Limestone Situation from Farmers' Viewpoint

Report of Illinois Limestone Conference Contains Facts and Statistics of Vital Importance to Quarry Men

THROUGH the courtesy of J. R. Bent, director of the phosphate limestone department of the Illinois Agricultural Association, we have been supplied with a copy of the report of the Limestone Conference at Springfield, Ill., February 27 and 28, 1924. This conference report undoubtedly represents the most exhaustive study and analysis of the agricultural limestone problem ever made from the point of view of the *consumer*—the farmer himself. It is bound to be of more than ordinary interest to every *producer* of agricultural limestone, not only in Illinois, but everywhere.

Introductory

During the last year or two, the Illinois Agricultural Association has received numerous complaints from various county farm bureaus and limestone using members to the effect that there are certain factors in the basis upon which limestone has been ordered and used, which have been disturbing in nature and have tended to prevent full and satisfactory development of the use of agricultural limestone in Illinois upon a stable and equitable basis.

In order that all facts might be brought out and the best plan developed, the phosphate-limestone department of the Illinois Agricultural Association sent to each county farm bureau a rather detailed questionnaire and has summarized for the state as a whole, the facts secured from nearly all counties by this means.

The department further called nine district or group conferences of representatives of the different county bureaus and discussed with each group the detailed phases of its own district problems in limestone. Each of these district conferences chose representatives who met in a state-wide conference in the farm bureau office at Springfield, Ill., on February 27 and 28. The first day of this state-wide conference was given over to a thorough discussion of the physical and commercial facts and the preparation of a detailed so-called statement of facts.

The second day was given to the consideration of constructive plans for coordinate work.

Statement of Facts Adopted by State-Wide Conference

SUPPLY—(1) The present supply consists almost exclusively of ¼-in. screenings necessarily produced as a byproduct of the crushed-stone industry.

(2) A small amount of pulverized stone is produced in individual cases, but at present this tonnage is relatively insignificant.

(3) The phosphate-limestone department estimates that between 400,000 and 500,000 tons of such ¼-in. screenings are produced annually on the present basis of demand for concrete aggregate and other sizes of stone in the hard road program of the state and other construction activities.

(4) The type of local crushing plants owned by district associations of farmers, is already filling a need in many localities not economically reached by any of the commercial quarries. There are over 130 such associations and plants in functioning existence in Illinois today. The demand for such plants will increase or decrease in direct proportion to any advances or declines in the delivered cost of limestone which may take place because of changes in the quarry prices, or freight rates.

DEMAND—(1) The demand in Illinois increased from 32,000 tons in 1911 to 350,000 tons in 1919; decreased in 1920 and 1921 to 247,500 tons and has been increasing again since, realizing about 300,000 tons in 1923, with an estimated demand in 1924 of 340,000 to 350,000 tons.

(2) It seems probable that the demand will continue to grow in actual tonnage and also in relation to the byproduct production.

(3) The quarry operators are actively backing efforts now being made to develop uses and outlets for their byproduct fines, otherwise than as agricultural stone.

PRICE—(1) The present demand, and (with short periods of exception) the demand heretofore, being, and having been, less than the supply, the result is that the price f.o.b. the quarries is governed by the law of supply and demand and is therefore less than the cost of production or the selling price of other sizes of stone.

(2) Direct production of agricultural limestone by means of pulverization is more expensive than is the production of commerical sizes of aggregate and ballast stone.

(3) The difference between a reasonable selling price for directly pulverized stone and the present average price of screenings at the quarries is relatively wide.

NEED—(1) Illinois is on the border line between the states considered still relatively virgin in fertility and those showing distinct signs of depleted fertility.

(2) Even as a practical working proposition, the economic need of the soils of Illinois can be most conservatively stated to be more than 5,000,000 tons as an initial application of limestone and then not less than 1,000,000 tons yearly to even maintain a fair degree of fertility. (This statement is based upon the needs of only the small percentage of land operated by farmers who are potential limestone users and not upon the scientific need of the entire farm acreage of the state. The latter is many times greater.)

(3) The need is growing yearly.

(4) It has been estimated that through leaching and drainage, the Mississippi river is carrying away annually from the soils of Illinois 2,100,000 tons of calcium and magnesium carbonates and this is in addition to what is removed by cropping.

From the foregoing, it naturally follows that:

(5) The need far exceeds the demand.

(6) The need far exceeds the byproduct supply, or any probable development thereof.

(7) Some well organized means of stimulating use and consequent demand, is necessary if an efficient degree of fertility is to be maintained in Illinois, for it seems probable that without such special efforts the natural development of demand will fall further and further short of the continuously increasing need.

Factors Affecting Efforts to Promote Demand

(1) Growth in the use of agricultural limestone received a reversal in 1920, due, first, to the reversal in that year of the financial condition of the farmer; second, to transportation troubles; and third, to the relatively high delivered prices of limestone. These high prices of limestone were, in turn, due first to the general conditions during the late years of the war and the period immediately following the war, and, second, to the fact that in some sections of the state the demand had "cleaned up" the byproduct supply and made pulverization necessary.

(2) The tendency toward recovery of the demand beginning with 1922, has been partly due to the distinctly lower prices offered by limestone producers who were confronted with a serious surplus and partly to the more general recognition by the farmers of the necessity for limestone.

(3) Farm bureau members, while appreciating the low prices at which limestone has been generally available, have been dis-

satisfied and somewhat discouraged by the discontinuance of the former practice of gaving a special price either through farm bureaus or to bureau members.

(4) It is in the financial interest of the farmer and necessary to the satisfactory development of good soil methods that the lowest price on agricultural limestone, compatible with continued adequate and satisfactory supply, be maintained.

(5) Reasonable stability and equitable uniformity of prices in the various parts of the state are essential factors if the demand is to grow satisfactorily.

(6) It is desirable that the delivered cost to the farmer be kept as low as is consistent with satisfactory supply, satisfactory service and development of use.

(7) Farm bureaus are, and in the nature of the case must continue to be, the greatest factors in the development of the demand for limestone, and the control of its proper use.

(8) Recognition of and compensation for the services of the farm bureaus are justified and desirable.

(9) A large majority of the farm bureaus of Illinois are demanding such recognition.

(10) Standardization and relative equality of prices and terms for all parts of the state make collective bargaining essential.

(11) Maintenance of the lowest price, consistent with all necessary service, satisfactory quality and permanence of supply, is furthered by centralized or collective ordering through the county farm bureaus.

(12) State-wide clearing of all orders would probably entail unsatisfactory delay.

Quality and Service

(1) More exact and dependable information as to the relative value of the different types of stone, especially dolomites as compared with high calcium stones, is important if, and where, the various types come in competition.

(2) More exact and dependable information is needed covering the degree of fineness it is economical to seek, in consideration of the increased cost of producing finer grades.

(3) Centralized state-wide service in inspection and supervisional work, in the interest of the maintenance, by each quarry operator, of satisfactory grade, service and weight is important.

Transportation and Freight Costs

(1) Illinois has low freight rates (generally speaking) on agricultural limestone as compared with other states.

(2) The tendency in the freight departments of the railroads has been to increase freight rates on agricultural stone, especially where shipments involving more than one road or switching movements are involved.

(3) Lower rates on agrciultural limestone (even below the actual cost of transportation) are justified from the railroads' own selfish standpoint, because agricultural welfare and territorial prosperity are vital to the railroads' welfare and depend primarily upon the maintenance of soil fertility.

(4) The higher railroad officials must be sold and kept sold on the proposition of the maintenance of soil fertility and encouragingly low freight rates on the requisite soil building commodities.

Recapitulation of Limestone Questionnaire

A questionnaire on the limetsone situation, which the phosphate-limestone department of the Illinois Agricultural Association sent to each county farm bureau, brought interesting responses from all of the organized counties in the state. This information has been recapitulated or summarized as follows:

The questionnaire was sent to all 94 bureaus (representing 95 counties), and all 94 responded.

Question No. 1 asked for the year in which the maximum tonnage of limestone was used in each county.

1	bureau reported	Year 1917
15	bureaus reported	Year 1919
14	bureaus reported	Year 1920
1	bureau reported	Year 1921
7	bureaus reported	Year 1922
43	bureaus reported	Year 1923
13	bureaus did not answer this question	

The total tonnage represented by the maximum year for each bureau as reported by 72 bureaus out of the 94 organized, was 363,203. This is an average tonnage for the bureaus reporting of 5044.49.

The total tonnage used in the 94 organized bureaus during the year 1923 was 298,623, or an average for each county of 3176.84 tons.

The anticipated tonnage to be used in the organized counties of the state in 1924 is over 350,000 tons.

The percentage of this business done through the county farm bureaus is 72.1%. Of the total tonnage of limestone used in 1923, 217,272 tons were ordered through the county farm bureaus.

Thirty-one of the organized bureaus of the state reported that the tonnage done through the farm bureau is increasing; 27 report their percentage is holding stationary; 28 report that it is decreasing; 7 do not report and 1 bureau states that it does not know.

Seventy-five bureaus state that farm bureau supervision is important; 4 state that it is desirable; 10 that it is unimportant and 5 do not report.

Sixty bureaus state that a special price is important; 25 state that it is desirable and the balance that a special price is unimportant.

Thirty-eight bureaus report that they have dealers in their counties; 43 do not have dealers; 6 have elevators only and 7 do not report. Thirty-four bureaus favor dealers; 40 do not favor them; 3 are indifferent; 1 does not know; 1 is doubtful and 15 do not report.

Forty-four bureaus report that storage is needed; 23 that it is not needed; 1 that elevators only are needed; 1 is doubtful and 25 do not report. Nineteen bureaus state that they have storage and 13 report that they do not desire storage.

Thirty-three bureaus report that they are using the uniform order blanks for limestone, as prepared by the phosphate-limestone department of the Illinois Agricultural Association and 49 have not, so far, used them.

(Note: At the conference, nearly all Advisers stated they would hereafter adopt this uniform method.)

Thirty-two bureaus state that they have a need and opportunity for local crushers.

There are operating today (or in operating condition) 135 local farm-owned crushers. There has been to date, only 14 failures of such local plants.

Working Plan Adopted and Recommendations Passed

The second day of the state-wide limestone conference was given over to the discussions of plans for constructive action to stabilize, standardize and develop the use of agricultural limestone in Illinois on a basis economical for the using farmers and that will give just and desirable recognition by commission or otherwise to the service which the farm bureau renders in such promotional work, and is beneficial to the quarry operator.

A motion was passed authorizing the chair to appoint a committee of three to prepare a report for general distribution covering the findings and conclusions of this two-day conference. Later, a motion was passed that a committee be appointed to negotiate with the various limestone producers for a better understanding and working basis between them and the farm bureaus; this committee to be given full authority to enter into such agreements with limestone producers, as might, in their opinion, seem necessary or desirable. The motion provided that it was the sense of the meeting that all county bureaus be urged to fully co-operate to this end.

Consideration was then given to the best method of placing orders upon the basis of the deal worked out with the limestone producers by the negotiating committee. It was moved that each county farm bureau, so far as possible, place its own orders with the respective limestone producers and send a copy of each such order direct to the phosphate-limestone department of the Illinois Agricultural Association. All such orders and copies to be written upon uniform blanks worked out by the phosphate-limestone department.

A motion was passed that the phosphate-limestone department of the Illinois Agricultural Association be asked to continue its supervisional work on the matter of quality of stone furnished and the service rendered by the various limestone companies, and that complaints (where the need arises) be submitted by the county bureaus through the phosphate-limestone department of the I. A. A. for action with the respective lime-

stone companies looking to proper adjustment.

A motion was passed that the committee on negotiations urge upon the limestone producers recognition by the latter of the propriety and desirability of a service commission to the farm bureaus on the part of the producers.

A motion was passed that it be the sense of this meeting that the attention of the authorities of the State University be called to the need for more exact and dependable information as to the relative value of different types of stone, especially dolomites as compared with high calcium stones, particularly with reference to localities in the state where the two types may come in commercial competition; also, that there is need for more exact and dependable information as to the degree of fineness to which directly pulverized stone may be economically reduced in consideration of the increased cost of producing finer grades.

County Agent "Boosting" Local Agstone Crushers

A BATTERY of 18 limestone crushers are fighting Grant county's (Wis.) sour soils.

"Last year we had some trouble in getting limestone crushers or pulverizers to work our county," says J. B. Keenan, county agent, "but this year we have 18 crushers owned and operated in the county."

While several carloads of lime have come into Grant county this spring, Keenan sees no reason why there should be any need to go outside for a single ton next year. He is urging all farmers who have deposits to get a sample tested and have a crusher get on the job at once.

Keenan claims that 90% of the farm lands of Grant county show need for lime.—*Jacksonville, Wis., Gazette.*

Crushed Stone a Cripple Creek Mine Byproduct

SEVERAL carloads of crushed rock from the plant at the Vindicator mine of the United Gold Mines Co. at Cripple Creek, Colo., will be used by the city of Colorado Springs in construction work on the streets, according to A. M. Wilson, city manager, but the majority of the 100,000 tons which have been ordered recently will go to Denver and Pueblo and possibly to contractors working on the Breed-Husted stretch of paving. Small eastern Colorado towns are understood to have contracted for some.

The crushing plant has been kept going all winter filling ordersf rom districts where cold weather has not interfered with the work and with the arrival of the warmer weather work will be pushed.

Cripple Creek crushed rock is in demand throughout the state, especially with highway contractors, and several carloads placed on county roads have proved superior to disintegrated granite hitherto in use.

Rare Granite to Be Made into Special Aggregates

WHILE green epedosite, a natural green-colored hard granite rock, has been discovered in several parts of the world, it has never been available in commercial quantities until discovery was made of a fair sized mountain of it in San Bernardino county, near Victorville, Calif.

George Reid, head of Reid's Quarries at Victorville, made the discovery several years ago.

Today the Green Epedosite Industrial Corporation has orders for its products from all parts of the country and recent inquiries have been received from export sources.

The company is capitalized at $250,000, a good share of which has been furnished by local capital. Plans are under way to build a new plant in City Terrace.

The green granitic rock is used in building construction for interior finish and trim, terrazzo flooring, pebble dash for building, stucco dwellings, bank fixtures, etc.

Benjamin Lewis is vice-president and J. W. Quinlan, secretary and treasurer.—*Los Angeles Examiner.*

El Paso, Texas, to Have New Stone Crushing Plant

G. E. CHARTRAND, local representative of Willite paving process, is negotiating with three of the biggest quarry machinery companies in the country for installation of machinery in a quarry at El Paso, Texas, to cost $75,000 to $150,000.

Crushed rock from the above quarry would be used in paving in the Southwest, El Paso being headquarters.

The chief engineer of a big machinery house in Chicago left after his visit for headquarters after completing estimates at a half dozen quarry sites here, one of the east side of Mount Franklin and the others in the vicinity of the cement plant on the west side of the mountain.—*El Paso, Texas, Herald.*

Interest in Leucite

LEUCITE is a silicate with a very high potash content which can be used as a basis for many important chemical products and which can be converted into an excellent potash fertilizer, as it contains potash combined with silica, the form most frequently found in the soil.

Scientific inquiries which are now entering on a commercial phase show that one can obtain from the leucite alum potassic salts, salts of aluminium and alumina, silica and soluble silicates, all of which are extensively used in the great chemical industries. Laboratory and field experiments show that leucite, when ground to a fine powder, gives results at least equal to those obtained by the use of potash salts, especially in the case of hoed plants such as potatoes, beets, etc.

It is found abundantly in parts of Wyoming and Montana and also British Columbia.

Miss Squires Develops New Lime Product

ACCORDING to a Manitowoc, Wis., news dispatch to a Milwaukee paper, a new industry for that city is foreshadowed by the purchase of the J. G. Johnson property abutting the river by Miss Mary E. Squire and Dr. Jessie Carpenter of the Allwood Lime Co., who plan eventually to erect a building on the property for the manufacture of a new lime product—a paint and varnish remover, a discovery of Miss Squires. The product is the result of a year's experiments by Miss Squires and Dr. Carpenter.

Vandals Bomb a Tractor at a Leavenworth, Kansas, Stone Quarry

A DYNAMITE explosion at midnight wrecked a Fordson tractor used by the owners of the stone quarry at Eighteenth and Ohio streets in Leavenworth, to operate a stone crusher. Broken bits of the machine were scattered in every direction. Underneath the tractor was a large hole blown in the earth. Strange as it may seem, half a stick of dynamite was found under the tractor. How it came not to explode with the balance of the charge could not be explained. Nearby was a long piece of burned fuse, used in firing the dynamite.

A further investigation revealed that the dynamite and fuse had been procured from the store house at the quarry.

J. M. Murphy, manager of the quarry, could advance no reason why onyone should wish to wreck the plant. He said there had been no disagreements with any employe and not one had been discharged.

New Idaho Lime Plant

A LEASE for 50 years on a limestone quarry north of Bayview, Idaho, and within sight of the town, has been taken by Belmore & Matthews of Lewiston, Idaho, said to represent large Portland, Ore., interests identified with paper making. It is understood that the rock will be used in paper manufacture. The lease was obtained from Carl Evans, a merchant, of Bayview; James Evans, Hilford Thomason and Frank Yokum of Sandpoint, Idaho.

The lease is on a royalty basis, which requires the payment of a stated sum for each ton mined, and is accompanied by a guarantee that 50,000 tons will be removed annually and that operations will be started this year. The plans are reported to include the installation of a crushing and hydrating plant and equipment to cost in the neighborhood of $140,000. Employment will be given to 45 to 50 men.

"The lime content is high, the magnesia low and there is little silica or iron in the rock," said Mr. Evans.—*Spokane (Wash.) Spokesman-Review.*

Ohio Limestone Boosters

New York Central Lines Operate Demonstration Train

THE view herewith shows some of the agricultural limestone boosters who went with the New York Central demonstration train under the supervision of Earle G. Reed, Ohio agricultural agent for the railroad company. This train will cover other parts of Ohio later this summer. Mr. Reed supplies the following data:

Exhibits and materials were furnished by the Soils Department of Ohio State University, Earl E. Barnes, special in soils and crops, Dr. George Valley and Prof. Charles Thrash, soil chemists, accompanied the exhibit from Ohio State University.

Limestone boosters on New York Central demonstration train

Co-operating in the operation and demonstration were the following: Soils Department, Ohio State University; County Agricultural Agents, Perry, Athens and Meigs counties; local farm bureau and grange organizations; local banks and business men's organizations; local newspapers and state farm press; local school officers and agricultural instructors; the National Agstone Association; three agricultural limestone manufacturers; the Delco Light Co.

The average attendance per county was 461, average attendance per stop (18) was 77. The smallest attendance was met at Fisher station, Athens county, 12 attending, and the largest was at Moxahala, Perry county, with 300 attending.

At practically every town the children of the upper grades of public schools were brought to the car accompanied by the instructors. In many of the towns the agricultural classes with their teachers visited the car, and were given instruction regarding the exhibits, limestone and purpose of the demonstrations. One agricultural class of 12 boys with their instructor came 15 miles to see the car, bringing with them several samples of soil from their parents' farms for testing. Of all the school children passing through the car (about 300 total from the upper classes), it is estimated that about 65% were members of agricultural or science classes and were children of farmers or lived on farms at present.

In addition to the soil samples tested and the screen and neutralizing tests run on local samples of limestone, three new "Limestone for Pastures" demonstrations were arranged by the county agent in Perry county and one similar pasture demonstration in each of Meigs and Athens counties.

It was found that approximately 80% of the soils tested in Perry county were sour, having a lime requirement up to six tons per acre; 70% of the soils in Athens county were of acid reaction and had a lime requirement up to four tons of limestone per acre. About 60% of the Meigs county soils tested required up to four tons of limestone per acre. More local limestone has been ground and used in Meigs county than in the other two counties.

The significance of the advertising poster head lines was clearly brought out in the results of the soil sample guessing contest. Of the 659 guesses no one correctly selected the three most acid soils from the 20 soil samples. Three men were tied for the nearest correct selection. After drawing out their names it was found that S. C. Winters of Crooksville, a town man and gardener, had won first prize and $25; E. L. Vest of Moxahala, farmer, second and $15, and Sidwick Vale, farmer of Dyesville, third and $10. Those who visited the car for the most part were convinced that one could not tell a sour soil by its appearance or feeling and

Typical agricultural class of country high-school boys, bringing samples of soil from their home farms to be tested for acidity

in many cases one would not be able to pronounce a soil sour even by the vegetation produced thereon.

Orders have already been placed for five carloads of limestone for Perry county. Of the 85 farmers who registered at the car from Meigs county, 32 indicated that they would use limestone this year, nine indicated that they would probably buy limestone this year but were uncertain. Of the 162 farmers who signed cards from Athens county, 31 indicated that they would use limestone this year and nine were not fully decided. In Perry county, of the 180 farmers registered 58 will use and order limestone this spring or summer, 13 have already ordered and 27 probably will do so but had not fully decided. The amounts of limestone to be used by each farmer vary from one ton to one carload.

ATTENDANCE AND RESULTS

County	Total Attendance	Registered	Limestone Tested	Soils Tested	Owners and Operators of Farms Registered	Students and Townspeople Registered
Perry	757	289	4	522	180	109
Athens	366	213	3	273	102	111
Meigs	249	148	5	141	85	63
Outside	12	9	....	....	....	9
Totals	1384	659	12	936	367	292

Limestone storage bins on track side sites will probably be constructed at Glenford, New Lexington, Moxahala and Rutland as a result of the operation of this exhibit car. Requests have been made for plans and cost figures for bins from three farmers.

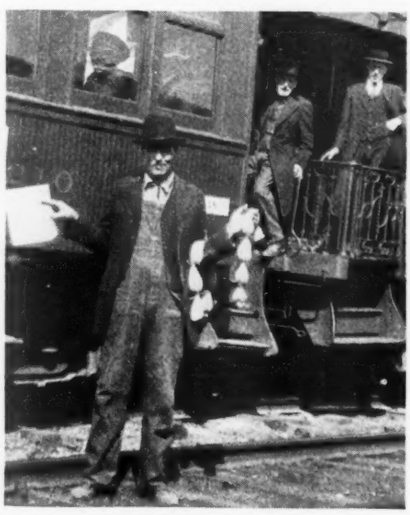
The newspaper articles and advertising space devoted to the operation of the limestone car is conservatively estimated, based on the copies of articles secured at over 190 column inches of news matter and 66 column inches of special paid advertising. This was carried in 14 newspapers of the territory served. Five of the 14 papers were daily and three have state wide circulation. The total circulation of the 14 papers as given by Lord & Thomas is approximately 258,000.

In addition announcements and articles regarding the operation of the car were carried by the *Ohio Farmer* (123,176), the *National Stockman Farmer*, Ohio edition (131,049), the *Macadam Service*, the (Ohio) *Farm Bureau News* and ROCK PRODUCTS.

The results of this exhibit car will be cumulative and no doubt farther reaching than can be estimated or put in figures at this time. The meeting with and showing of exhibits to students, particularly the agricultural classes, reaches the foundations of our coming farming population.

Activities of National Agstone Association

Secretary A. P. Sandles of the National Agricultural Limestone (Agstone) Association co-operated. Coincidently the association has issued a very interesting and instructive circular summarizing results of tests in various states as to the effect of fineness of grinding on the availability of limestone.



Farmer who brought to the car 36 samples of soil from different fields and locations on his farm; he had a sketch of his farm plan and a number for each sample and its location

This bulletin is No. 12 of a series issued by the National Agstone Association in co-operation with the Ohio State University, where the association maintains a research scholarship. Secretary Sandles has issued the following advanced program of this library research service:

A. GROUND AGSTONE — 50% THROUGH A 100-MESH.

April—"The Philosopher's Stone."
May—"The Tale of the Teakettle."
June—"Why the Sea Is Salt."
July—"As Sour as Vinegar."
August—"Too Poor to Grow Beans."
September—"A Stitch in Time Saves Nine."
October—"While There's Life There's Hope."
November—"Two Blades of Grass Where One Grew Before."
December—"Limestone Makes the Father Rich."
January—"History Repeats Itself."
February—"We Learn by Experience"
March—"The Wonderful Pitcher."

B. AGSTONE MEAL — 80% THROUGH A 10-MESH.

April—"Alfalfa for the Dairy Farm."
May—"Sweet Clover for Pasture and Soil Improvement."
June—"Red Clover for the General Purpose Farm."
July—"White Clover in Permanent Pastures."
August—"Soybeans for Emergency and Seed."
September—"Peas, Beets and Cabbages."
October—"Boosting the Corn Yield."
November—"Agstone for Dairy Cattle and Hogs."
December—"Agstone for Poultry."
January—"Agstone for Man."
February—"Agstone. How Much Do We Use? How Much Should We Use?"
March—"Big Crops. Why Grow Them and How?"

C. SCREENINGS.

1. "Grit—How 'Bill Jones' Did It."
2. "Quarter Inch—What the Farm Press Says About Agstone."
3. "Dust—Technical Points About Limestone from Scientific Papers, Bulletins and Circulars."

Interior of exhibit car—soil testing bench at the far end

Another interior showing posters and other literature and data

Along the Tennessee-Georgia Line

Cement and Lime Plants in the Region North of Atlanta and Around Chattanooga

By Edmund Shaw
Editor, Rock Products

THE quarry face of the Ladd Lime and Stone Co. is about the most prominent feature in the landscape west of Cartersville. It is 200 ft. high and perhaps a thousand feet long extending almost to the top of the mountain. In the early morning light it is rather beautiful owing to the display of colors, a light yellow, a brilliant red, which shows everywhere in this district when the earth is moved, and the deep blue of the dolomite which is quarried for lime.

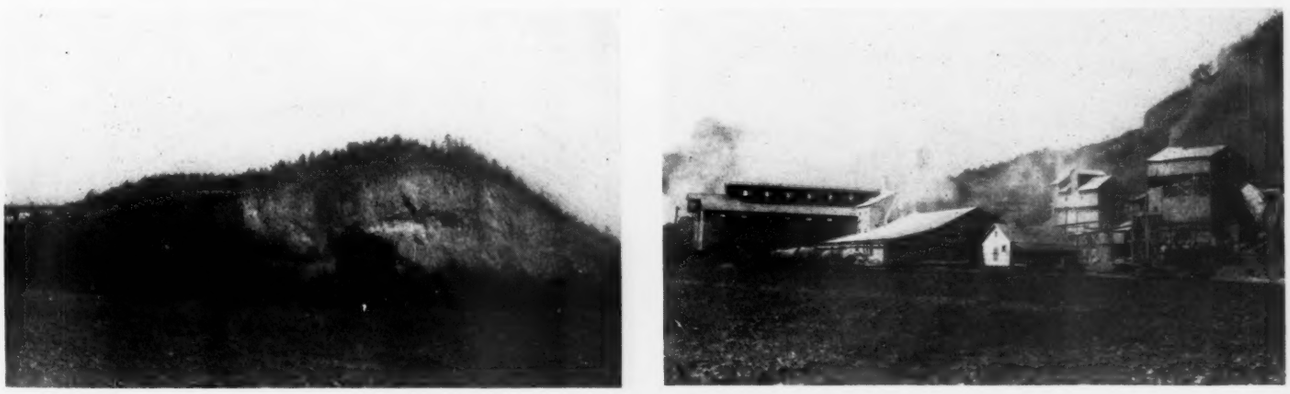
The upper yellowish band is a silicious limestone that was formerly burned to hydraulic lime, before portland cement became so easy to obtain. It had many of the properties of portland cement, but not the strength so that it could not be used for structural work, such as bridges and buildings. This silicious limestone now furnishes an excellent crushed stone for aggregate in concrete construction and for similar uses.

The Ladd lime plant was designed by Richard K. Meade and was described in ROCK PRODUCTS for June 13, 1921. There are eight kilns and they are all kept very busy these days, as the Atlanta market seems to have an unlimited appetite for lime. The company is also an important producer of crushed stone and asphalt filler, and a notable improvement of comparatively recent date is its washing plant for cleaning quarry waste. By the use of a log washer all clay balls are distintegrated and washed away and the cleaned stone is so free from dirt that it will not soil a handkerchief.

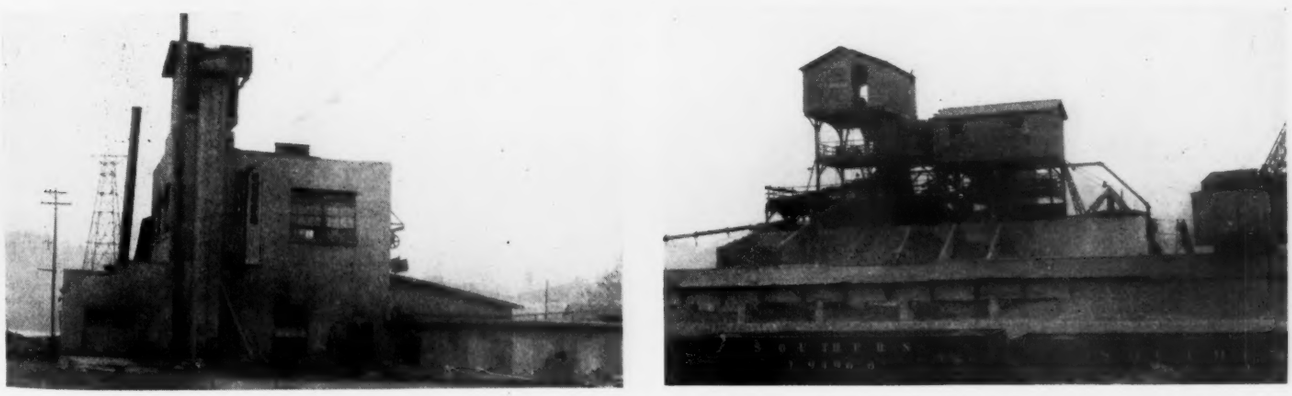
Chattanooga Industries

At Chattanooga, the Dixie Portland Cement Co.'s sand and gravel plant was the first visited. There have been a number of improvements made in this splendid plant since it was described in the June 16, 1923 issue of this paper. A Robbins "Cataract" grizzly has just been installed and a new Worthington gravel screen. This company has solved one of the ever present problems of the sand and gravel industry, the crushing of gravel to small sizes by installing 72-in. rolls, a magnificent machine that does the work and does it efficiently, although the cost of such an installation would prevent its adoption by most small producers.

At its cement plant the Dixie company has installed a 42-in. McCully gyratory crusher. And it is putting in a wet grinding plant that will be about the last word in this line when it is completed. Everything about this plant is splendidly built and the effect of good construction is reflected in the work. One noted, for example, how



Left: Quarry face. Right (in order from left to right): Kiln house, hydrating plant, stone crusher and fine grinding plant of the Ladd Lime and Stone Co.



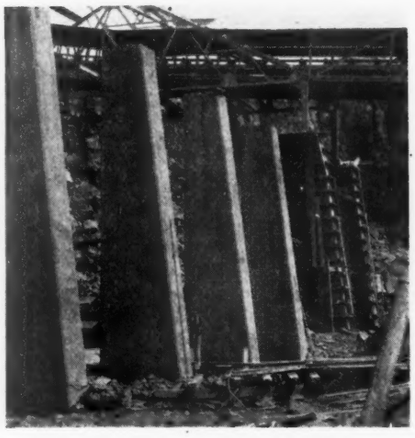
Left: New concrete products plant, and (right) washing and screening plant of the Dixie Sand and Gravel Co.

smoothly and steadily the conveyors all ran, without a trace of side motion.

After the new wet grinding plant is completed two more kilns, now in place, will be operated in addition to the six now being run, which will add considerably to the yearly output. A rock storage of 85,000 tons capacity is also being constructed. The material will be handled in and out by a bridge crane.

The Signal Mountain Portland Cement Co. is producing all that its two kilns will turn out and is going ahead with its plans for a larger plant. Mr. Steward, the vice-president and manager of the company says that the work that it being done is hardly to be considered as "improvements" since it is only carrying out the original plans of the company for building a 4-kiln plant, and the demand of the market justifies the company in pushing the work to completion as fast as possible. At the time of my visit a new compeb mill and 500-hp. motor were just being placed on the foundations and other machinery for a third unit was on the ground.

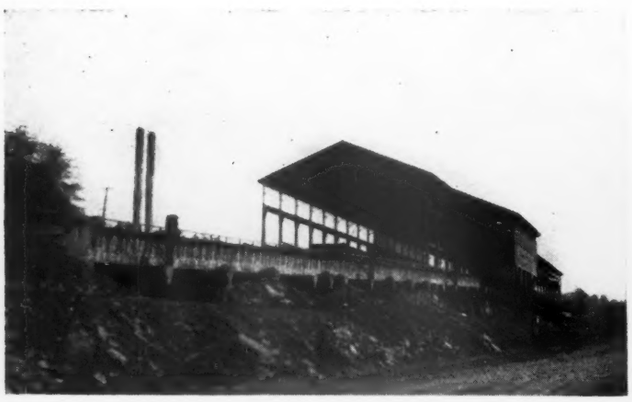
The Gager Lime Co.'s plant, which is about 50 miles out of Chattanooga on the road to Nashville was the last plant visited. This plant is known far beyond its regional market by reason of the high quality of chemical lime that it produces. Lime is produced here for making lime acetate, calcium arsenate, oil refining, for use in the paper pulp industry and similar uses in large quantities as well as for building purposes, and the 16 kilns are busy night and day, with a rotary kiln which is run intermittently to catch up with the peaks of the demand. A description of this plant will appear in a later issue.



Building new rock storage—Dixie Portland Cement Co.

Conditions in the Southeastern states are good and from what one may gather in a hasty trip they bid fair to remain so. One learned from good authority that the cement sales in the Atlanta district for the month of March 1924, were 50% greater than the sales in March, 1923, and that was considered a good month at the time. As this increased use of cement demands an equal increase in aggregate, and means an increase in other building materials, it may be seen that the entire rock products industry in the Southeast is in a very healthy condition. Labor is not so scarce as formerly and the migration of negros to the Northern cities is ebbing somewhat. With fair crops and decent prices for agricultural products the Southeast will be in a strong position throughout 1924.

Those who have read the preceding letters of this series will note that at every place visited there is a very considerable increase in the production of rock products. At Memphis the big plant of the Central Sand and Gravel Co. and the new Crow Creek plant are adding to the aggregate supply. At Nashville T. L. Herbert & Sons and the Hardison Co. are building units to largely increase production and the new plant of the Franklin Limestone Co. is about ready to go. At Birmingham the Lehigh Portland Cement Co. is increasing its capacity 25%. A new cement plant is being built by the Clinchfield Portland Cement Co. at Macon and the Dixie and Signal Mountain plants are both enlarging as noted here. At Mont-



Signal Mountain Portland Cement Co. Left: The incline from quarry and bridge crane that serves all plant units. Right: The kilns and cement storage in the background

Gager Lime Co. Left: Office building and hydrating plant. Right: The quarry face

gomery the 4000-ton plant of the Montgomery Gravel Co. and the 8000-ton Roquemore plant have just begun operations, while the Kirkwood Sand Co. is starting its new dredge and the Alabama Gravel Co. is increasing production by starting a new dragline. At Atlanta there is a new stone plant running and others building or to be built shortly.

This list is by no means complete but it is enough to show the large increase in rock products plants and addition to plants. And in every case the increase has been justified, not only by the prospective work for which these rock products are required, but by the amount of actual orders which could not be filled by the present equipment.

Is a Producer Who Sells State Highway Material Necessarily a Crook?

Assumption That He Is May Lead to Interesting Developments in Missouri

ARE producers of sand, gravel, crushed stone and cement any different from the average citizen because they happen to supply material that the state needs? Should they for that reason be barred from the rights and privileges that every other citizen enjoys? Are they exempt from their responsibilities as taxpayers and shareholders in the commonwealth because they are producers of sand, gravel, crushed stone and cement?

Ever since the present state highway administration took charge in Missouri it has been in continual controversy with the men who supply the necessary materials for road construction. The fundamental cause of this controversy seems to be the assumption on the part of the state highway authorities that a producer, *per se*, is a crook and is out to do the state, and that the only way to prevent him is to be a "smarter Aleck" than he.

This method of doing business is unbecoming a great state to say the least. It may be still the method in trading horses, but it is archaic so far as dealings in the modern business world are concerned. A business man is generally assumed to act in good faith unless proved otherwise. Business men have long since learned that it is *good business* to assume fair dealing, because they know harmony and *mutual trust* are essential to the success of any undertaking.

The sand, gravel and crushed-stone producers of Missouri were invited to a public hearing by the members of the Missouri State Highway Commission at Jefferson City, Mo., on Tuesday May 13. One of Rock Products editors, Edmund Shaw, was present. He reports: "I have tried to write coolly, but I am so hot under the collar that it is hard to do so. Any fair-minded man would be as indignant as I am if he had attended the meeting. The producers were asked to come down and say what they had to say, but they were 'steam-rollered' from the very start. The whole attitude of the commission was that the producers were trying to hold up the state, and were necessarily a bunch of profiteers and grafters."

Mr. Shaw further reports:

The state of Missouri has let certain contracts which on the face of them are obviously not only unfair to the regular producers but so impossible of fulfillment that they are justified in protesting against these contracts not merely as producers but as citizens and taxpayers.

It was to protest against these contracts that the following producers were present at the meeting of the State Highway Commissioners held at Jefferson City on May 13: Fred Johnson and Will Bugg, Kansas City Quarries Co.; W. M. Spencer, of W. M. Spencer's quarry; Frank Peck and L. E. Leach, of the Munsey Sand Co.; C. W. Bartlett, Kaw River Sand Co.; H. B. Thompson, of H. B. Thompson Stone Co., and J. A. Moore, of S. J. White Stone Co., all the above of Kansas City. From other towns came: Geo. Wallau, Jefferson City Sand Co.; A. E. Fisher, Glasgow Sand Co.; Harry E. Moore, Boonville Sand Co., and G. Porter, of Porter & Adams quarries, Plattsburg.

Will Personally Investigate Proposed Quarries

THE descriptions of the two quarries in controversy here given are necessarily based on hearsay evidence. I feel sure the operator is acting in good faith. I intend to make a personal investigation of these properties for the benefit of fair play and in our readers' interests.—Edmund Shaw, Editor.

Alleged Terms of Proposed Contract

The two contracts against which these producers wished to protest are for furnishing the state 675,000 tons of rock at $1.25 per ton. The terms of the contract have not been published but are understood to be that the state is to buy $250,000 worth of machinery and trackage for these quarries, for which the producer is to pay by deductions from the contract price. He has to put up a bond of $125,000. The title to the machinery, of course, remains in the state until it is paid for.

The terms under which the regular producers were asked to bid for the same stone as brought out by Mr. Porter at the meeting were: That a bond for half the amount of the contract must be given to the state (which on the above contract would amount to $421,875); that 33% of the requirements must be carried in storage and that in some cases freight must be prepaid. Nothing was said or intimated as to the willingness of the state to advance money for the purchase of machinery to enlarge production. On the contrary, Mr. Porter found it impossible to secure the backing of banks for such a purchase on the basis of his obtaining a contract from the state.

In making his protest, Fred Johnson attempted to lay before the commission certain facts about one of the two quarries which the state is to finance under the contract and handed the commission photographs of the quarry face and a sketch showing the ledges. He was promptly "steam-rollered" by Chairman Gary on the ground that the case was closed and that no action could be taken by the commission. W. M. Spencer, who followed him, therefore confined his remarks to making a protest that would go on record as a possible basis for legal action later. Frank Peck tried to find out how the commission arrived at certain costs in their published figures of sand and gravel cost to the state, but was told to take up the matter with the engineer of the commission. So the protests did not get very far.

A part of the evidence regarding the stone quarry which the commission refused to hear will interest every crushed-stone producer. It is the formation of this particular quarry from which it is proposed to furnish crushed stone at $1.25 a ton. An average part of the face (the quarry was worked for some years so that the face is well exposed) showed as follows, according to Mr. Johnson:

"Face" of one proposed quarry

	Feet
Top, clay	2
Shelly rock	1½
"Shotty" shale	4
Limestone	8
Yellow shale	3
Limestone	1½
Blue shale	1½
Limestone	6
	27½

Those readers of Rock Products who are crushed-stone producers are fully capable of judging whether crushed stone can be produced from such a mixture at $1.25 a ton—*especially when it must meet the stiff specifications of the Missouri Highway Commission which allow no stone containing clay, shale or foreign matter to be received.*

As regards the other quarry location, no particular information was given and the ground has not been opened so that not much can be learned about it. Mr. Regal, who is chief highway inspector and has charge of the testing work for the commission, stated that the rock was of the Plattsburg formation, which he considered as good as the Bethany Falls. To understand this it must be explained that there are several ledges of limestone rock quarried about Kansas City which have local names, such as the "Iola," the "Wintersett" and the "Bethany Falls." The latter is supposed to be more even in hardness than the others and to be the only one from which rock can be quarried that will meet highway specifications. These call for a French co-efficient of seven. In the opinion of producers who have been long in the rock business the quarrying of any other ledge than the Bethany Falls to meet highway specifications is something of a gamble.

Would Save State from Gambling with Public Funds

But the position of the producers is that the whole project is a gamble—and a very bad gamble—with the state's money. They ask to go on record in Rock Products as taking this position, basing their attitude on the facts that with their quarries well opened and in the best condition for production they cannot produce stone for less than $1.35, actual operating costs, with no allowance for obsolescence, depletion or depreciation. This comes from the fact that they must discard practically one-half of all that they quarry either as strippings or material that must be sorted out before it will meet specifications. And as regards the quarries the highway commission is backing, practically all of these quarrymen have each had an opportunity to purchase at one time or another, and many of them have made careful examinations with the view to purchasing, but as experienced quarry men they have turned the propositions down because in their judgment such quarries could not be worked with a hope of profit.

Proposed Contract for Sand

As regards the other contract this is a contract which the highway commission "entered into over night," to use Chairman Gary's own words, to buy 100,000 tons of Missouri river sand pumped in a pile on the river bank at 20 cents a ton. No regular producer was ever asked to make a bid of this kind. The highway commission must build a track to the pile of sand and load it.

This is the sand which it was widely advertised the state of Missouri was buying for 20 cents a ton. Mr. Piepmier, the highway engineer, informed the writer that he knew he could load it for 20 cents a ton, making 40 cents, to which of course must be added the expense of building a track, etc. He further informed the writer that the sand tested 136% Ottawa in its unwashed condition, so that there would be no expense for washing. But sand at 40 cents a ton plus something more is a long way from the 20-cent sand so widely advertised. And the publicity given it has done real harm to a great basic industry all over the country—to say nothing of the precedent of using an unwashed sand, when unwashed sand from no other source is acceptable.

We Quote Herbert Hoover

I AM ONE of those who believe in the substratum of inherent honesty, the fine vein of service and kindliness in our citizenship. The vast volume of goods and services that daily flow through the land would cease instantly were it not for the instinctive dependence of our people upon the moral responsibility of the men who labor in the shops and farms and the men who direct our production and distribution.

In these times of muddled thought it is sometimes worth repeating a truism. INDUSTRY AND COMMERCE ARE NOT BASED UPON TAKING ADVANTAGE OF OTHER PERSONS. Their foundations lie in the division of labor and exchange of products. For through specialization we increase the total and variety of production and secure its diffusion into consumption. By some false analogy to the "survival of the fittest" many have conceived the whole business world to be a sort of economic "dog eat dog." We often lay too much emphasis upon its competitive features, too little upon the fact that it is in essence a great co-operative effort. And our home-made Bolshevist-minded critics to the contrary, the whole economic structure of our nation and the survival of our high general levels of comfort are dependent upon the maintenance and development of leadership in the world of industry and commerce.—Herbert Hoover at Cleveland, Ohio, May 7, 1924.

Face of other quarry

Cement Bids in Alabama

OPENING of bids for cement on the first 17-mile project in Chilton county of the Montgomery-Birmingham highway and the advocacy of a state-owned cement plant featured Thursday's session of the State Highway Commission.

Bids of four portland cement companies averaged around $2.54 per bbl. delivered for 66,000 bbl. which will be used in the project. The bid for slag cement averaged over 15% less than the portland cement bids.

The slag cement bid was only on 36,000 bbl. which will be used in the base of the new road. Each company bidding provided that the state could get 10% off for payment 10 days after delivery. The state will also get 10 cents per sack for all sacks returned in good condition. These provisions reduce the price of cement per barrel to a trifle over $2.

J. D. Truss, an engineer, former member of the legislature and a former member of the city commission of Birmingham, appeared before the commission and advocated the construction by the state of a cement plant. Mr. Truss said it would well pay the state to construct a 4000-bbl. capacity plant at a cost of around $1,250,000 to manufacture cement. He said in his opinion the amount to be saved would soon pay for the plant. He advocated the working of convicts at the plant.—*Birmingham News.*

Alabama Cement Contract

THE Alabama State Highway Commission, at its meeting April 29, awarded the contract for furnishing cement to be used in constructing a portion of the Birmingham-Montgomery highway, in Chilton county, to the Lehigh Portland Cement Co. of Birmingham. The company is to furnish 66,000 bbl. of cement, more or less, at the average price of $2.54 per barrel delivered.

Muscle Shoals Dam Needs 56,000 Barrels of Cement for 20 Days' Supply

ORDERS were placed by the United States government on April 20, for an additional 56,000 bbl. of cement for the Wilson dam at Muscle Shoals. The contracts went to the Atlas Portland Cement Co. at Birmingham, the Phoenix Portland Cement Co. of Birmingham and the Dixie Portland Cement Co. of Chattanooga, also the Lehigh Portland Cement Co. of Birmingham. The two first mentioned companies received 20,000-bbl. orders and the two latter 10,000 and 6000 bbl, respectively. At the present rate of consumption the amount of concrete ordered would last approximately 20 days. It was stated the stock on hand was in the neighborhood of 80,000 bbl. and the new order merely brought the stock up to the usual amount.—*Birmingham, Ala., Age-Herald.*

March Imports of Cement

NORWAY secured first position as the principal producer of imported cement, its exports to this country during the month of March amounting to 11,066 long tons. Belgium ranks second with 10,580 long tons and Denmark secured third place with 4733 long tons. The customs district of Los Angeles continued to be the chief entrepot for the foreign cement, 7999 long tons having entered this district during March.—*Department of Commerce Bulletin.*

Reduced to barrels this means that during the month of March 158,270 bbl. of cement were imported into the United States, of which 66,394 bbl. came from Norway; 63,478 bbl. from Belgium; 28,398 bbl. from Denmark.

Oklahoma Likely to Make State Contracts for Cement

DURING a recent session of the Oklahoma State Highway Commission a study was made of the contemplated plan for the purchase of road materials by the state itself, and contracts will be let for the gravel to be used in repairing the Tulsa-Muskogee highway through Wagoner county.

Members of the commission have been much encouraged by their preliminary survey of the possibilities of savings through state purchase of materials. Roy M. Johnson of Ardmore, one of the commissioners, has been in correspondence with a big Chicago engineering firm, which assures him there is possibility that Oklahoma may save 50 cents per barrel on all cement by following the example, among others, of the Illinois and Michigan highway departments.

Cement manufacturers offer special prices, in order to keep their plants in operation, to purchasers who place contracts and take the cement during the winter months. In addition to this 10-cent discount, states thus placing their orders have been given the benefit of the 10 cents allowed dealers, and then there is another 10-cent saving through buying by the carload and paying cash.—*Tulsa (Okla.) Tribune.*

Air Supply for Combustion in Cement Kilns

A METHOD of getting the maximum temperature in a cement kiln where it is most desired is described by Otto Dormann, of Stettin, Germany, in Patent 1,484,254, issued February 19, 1924.

Recent investigations have established the fact that the sintering reaction in cement manufacture is exothermic, so that maximum temperatures are not required in the sintering zone of the kiln but rather in the calcining zone just preceding, where the reaction is endothermic.

Mr. Dormann proposed to obtain the desired result by introducing secondary air into the calcining zone at high pressure and at an angle in a direction opposed to the flame. This causes the formation of eddies which give an intimate mixture of fuel and air. At the same time the gases are dammed up in such a way that they will not pass across the material at a higher speed than is consistent with reasonable heat transfer to the cement.

The secondary air may pass longitudinally through the kiln walls before reaching the discharge orifice and thus become preheated. Additional fuel may also be mixed with the charge. This will be burned by the secondary air.—*Chemical and Metallurgical Engineering.*

Something of the same idea applied to shaft lime kilns was described in Rock Products, April 5, 1924, pp. 41-43 inclusive.

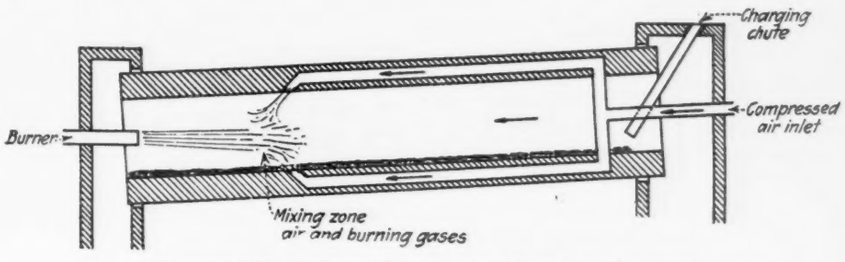
[To save you looking in the dictionary "exothermic" means a heat-liberating reaction; "endothermic" means a heat-consuming reaction.—Editor.]

North Carolina Rock Products Win Exposition Space

ROCK PRODUCTS notices with much gratification the increasing appreciation of stone, and sand and gravel on the part of the public. Every week brings fresh evidence of this in the form of newspaper clippings describing and illustrating producing plants. This is good publicity. Exhibits of rock products also help. *Natural Resources,* Chapel Hill, N. C., states:

Natural resources as the basis of North Carolina prosperity was the idea dominating the exhibit the North Carolina Geological and Economic Survey held at the Eastern Carolina Exposition in Kinston, April 7-12.

Forestry, especially in relation to the lumber industry, is a matter of vital concern to the eastern section of the state, and will accordingly be featured. Drainage projects have in many instances vastly benefited eastern Carolina. Sand, gravel, and clay are natural resources, long neglected, but now being more and more utilized in building up a balanced prosperity. These will be shown and another feature will be an instructive chart of the hydro-electric systems of the state, defining their relation to and possible utilization by eastern North Carolina industries.



Cement kiln designed for air supply at burning zone

The Atlas Aluminate Cement Co.

Official Announcement of Characteristics, Tests and Uses

WRITING under date of May 7, 1924, L. R. Burch, president of the Atlas Aluminate Cement Co., 25 Broadway, New York City, informs the trade:

"Cognizant of the apparent increasing demand among engineers and the construction industry generally, for a cementing material of such special qualities, and desirous of keeping pace with all forward steps in the construction field, this company was formed after an investigation of similar cements in France, to acquire the so-called Spackman patents which cover, in this country, the manufacture of all high alumina cements.

"After months of experimental manufacture we are now prepared to produce our 'Lumnite' cement at Northampton, Penn., in ample quantities to meet any demand as it develops."

Property and Uses
By Henry S. Spackman

Characteristics: "Lumnite" cement is a hydraulic cement. Besides possessing the desirable qualities of portland cement, "Lumnite" cement develops a strength at 24 hours somewhat greater than that of portland cement at 28 days. In Europe, similar cements are generally accepted as being resistant to the chemical attack of sea water and sulphate bearing ground waters.

Manufacture: The raw materials include a large proportion of high grade aluminum ore (bauxite). The raw materials are fused and then ground to considerably greater fineness than the requirements of the standard specifications for portland cement.

Chemical Composition: "Lumnite" cement is essentially aluminous. Its chemical composition in round numbers is as follows:

	%
Silica, magnesium, insoluable, loss, etc.	5
Alumina ($Al_2 O_3$)	40
Lime (Ca O)	40
Iron oxides	15

Strength: Laboratory tests indicate the following compressive strength for "Lumnite" cement concrete:

(Each value represents strength in compression of three specimens in pounds per square inch.)

	1 "Lumite" cement 2 Sand 4 Pebbles	1 "Lumite" cement 3 Sand 6 Pebbles
1 day	3441	2071
2 days	3818	2444
3 days	4127	2598
7 days	4391	2663
28 days	4462	2691

Method of Use: "Lumnite" cement is used in the same way as portland cement except that, on account of its more rapid hydration, somewhat wetter mixes should be used. Portland cement, even in very small quantities, should not be mixed with "Lumnite" cement, as this destroys the properties of both materials.

For those unfamiliar with the developments of alumina cement during the past 12 years, a summary of its peculiar qualities and important uses may be of value.

First of all it attains at 24 hours a strength somewhat greater than the strength of normal portland cement at 28 days. This does not mean that it is "quick-setting." It allows the usual ample time for mixing, transporting and poring in forms; but after setting its high strength develops with phenomenal rapidity.

Roadways, for example, laid one day may safely be opened to the heaviest traffic the following day. Bridges can be poured one day and the forms removed and the bridge thrown open for traffic within two days thereafter. In structural work forms may be removed and use for new sections in not more than one-tenth the time required for portland cement. Week-end repair jobs can be done in "Lumnite" cement that would block whole sections of industrial plants for several weeks were portland cement used.

"Lumnite" on account of the large content of high-grade aluminum ore in the raw materials necessarily costs more per barrel than portland, but wherever time, chemical requirements or additional structural strength are important and costly factors, the use of "Lumnite" cement effects large savings in the total construction cost.

The second distinctive element of "Lumnite" cement is its high resistance to certain forms of chemical attack. In France it seems to be accepted by authorities that alumina cement is unaffected by the chemical action of sea water or by sulphate bearing ground waters. The large railroad in the south of France for this purpose has utilized it in large quantities for some of its important construction.

From a few examples, taken from the experience of users of similar cements in France, we can draw some conclusions as to the market for this material in America

Take for example, road work. At Le Teil, France, a section of concrete road, poured between 8 p.m. Saturday and midnight, was opened to traffic early Monday morning and carried a five-ton tractor, hauling heavy loads, without even marking the concrete. At Luzerne, Switzerland, a bridge was opened to traffic 48 hr. after the concrete was poured. A 12-ton tractor passed over the bridge the first day, without causing any injury. In the construction of a reinforced concrete building at Chateau Roux, Indre, France, the forms were removed in 48 hours from the beams and in three days from the girders, effecting a saving of two-thirds of the form lumber that would otherwise have been required for doing the work with portland cement. The French Army was able to construct the concrete foundations for its big guns and put the guns into operation within 24 hours, through the use of this product.

All of this would indicate that the unique qualities of aluminate cement make it particularly valuable for emergency and repair work about railroad terminals, yards, bridges and abutments; street pavement and repairs where traffic cannot long be held up; week-end construction or repairs in industrial plants and power houses; building alterations where business cannot be suspended or occupancy must be quickly permitted; mine and tunnel work; concrete subject to chemical attack in chemical industries and paper mills; foundations and other concrete construction in alkali soils; also all classes of work where rapidity of construction involves a large saving of capital both to the contractor, state, municipality, industrial concern or private owner for whom the work is being done.

Michigan Candidate for Governor Scores State Cement Plant

HERBERT F. BAKER of Cheboygan, probable candidate for the Republican nomination for governor this fall, in an address here Thursday charged that the state administration disregarded the constitution and the legislature to purchase " an antiquated cement plant owned by a Jackson banker who had a friend on the administrative board."

He referred to the recent action of the board when it leased a plant at Chelsea with the option of buying. The speaker asserted that the plant is antiquated and equipped with wornout machinery and that large amounts of money had been spent to put it in shape.

"Figuratively," he stated, "the banker must have felt like buying the boys a drink after that was put through."

He charged that the embarkation of the state into the cement manufacturing business is depriving residents of Chelsea of their means of livelihood, "because the plant is to be operated with prison labor."—*Cadillac, Mich., News.*

Detroit's New Cement Plant

ACCORDING to the Detroit, Mich., *News*, the idea of the Peerless Portland Cement Co. in constructing a Detroit plant is based upon elimination of transportation difficulties for Detroit users who provide a market for more than 12,000,000 sacks per year and upon the utilization of heretofore waste products from Detroit industries for the manufacture of cement. Direct truck delivery to all users within a radius of 25 miles of the plant will provide immediate service at all times.

The Peerless company was organized in 1897 and for the past 26 years has manufactured cement continuously at its plant at Union City. Combining the production of both the new Detroit factory with that of the Union City factory the total annual output will reach 7,200,000 sacks.

Asks an Injunction to Prevent Gravel Plant from Muddying Water

MUDDY water is such an unwholesome beverage for cows on his plantation that G. C. Passmore filed through his attorneys, a petition in equity court to enjoin the Montgomery Gravel Co., whose plant, he alleges, contaminates the stream that runs through his land and pasture, in upper Montgomery county.

In addition to this complaint, Mr. Passmore avers that he has spent large sums of money in constructing an ideal camping ground, the main attraction to visitors being the mirror-like beauty of a lake on the stream, Mill creek, which has become muddied by the plant, one-quarter of a mile above.—*Montgomery, Ala., Advertiser.*

Moulding Sand Company Purchases New Property

E. B. MANLEY and George B. Manley, of the Rockton Molding Sand Co., Rockton, Ill., recently purchased 30 acres of sand on the E. A. Morgan farm near Elwood, Ill. The sand is a level stretch averaging 4 ft. in depth. It has been thoroughly tested and is pronounced of the finest quality. It is estimated that it will require ten years for the removal of the sand from the farm. The surface layer must then be replaced and the ground left in good condition. The Rockton Molding Sand Co. sells to nearly all of the largest consumers in Chicago, Milwaukee, Rockford and Gary.

This branch of the industry will be known as the Elwood Division of the Rockton Molding Sand Co.—*Willmington, Ill., Advertiser.*

New Missouri Gravel Plant Has Contract for State Road Material

THE Howell Gravel Co. of Palmyra, Mo., which has the contract to get out some gravel for the state highway department for a period of four years, received a shipment of heavy machinery recently. The gravel will be mined with a Sauerman slack line cable way outfit. The steam hoisting engine weighs 20 tons, as the railroad's bill of lading showed, and is equipped with double cylinders of 12-in. bore and 14-in. stroke. It will operate a 2-yd. bucket.

This outfit will be used in loading railway cars only and will have a capacity of 40 cars a day. Operations will begin about June 1, according to W. F. Howell of the Howell company.

Besides the carload shipments, 20,000 yd. of gravel has been contracted for use on the Canton road project, Mr. Howell said, and this will be trucked out.—*La Grange, Mo., Indicator.*

Building Required in 1924 as Seen by Portland Cement Manufacturer

THAT nearly all business is dependent to some extent on the activity of the building industry is the opinion of B. L. Swett of the Lehigh Portland Cement Co., a recognized national authority on building conditions. Speaking of building prospects, he said:

"An analysis of the extent to which the construction work of the country is in arrears," Mr. Swett said, "must take into consideration the increased quantity of construction normally required each year, as well as the variations in the unit cost of construction.

"It is possible to compute with reasonable accuracy the quantity of construction work required annually per capita of population, and, assuming 1913 as a normal year, we find that the normal volume of construction required in 1924 is approximately 120% of the 1913 volume.

"My use of the word 'volume' means the actual quantity of construction, not the value of construction, as value is determined by variation in cost.

"By adding the normal construction requirements for each year since 1913 and comparing these with the actual volume of construction accomplished during each intervening year, we arrive at a fair measure of the volume of construction remaining in arrears. Such a computation shows me that the building needs are in arrears to the extent of fully a year's building program."—*New York Times.*

Allis-Chalmers and Power-Mining Combine

AN ANNOUNCEMENT of much more than ordinary interest is contained in the advertising pages of this issue of ROCK PRODUCTS. It gives the official statements of the Allis-Chalmers Manufacturing Co. of Milwaukee and of the Worthington Pump and Machinery Corp. of New York City. The Power and Mining Works of the Worthington company at Cudahy, Wis. (near Milwaukee), have been closed (effective April 29) and all lines of machinery and equipment made there have been taken over by the Allis-Chalmers Manufacturing Co.

The Allis-Chalmers Manufacturing Co. announces:

"Our superior facilities of equipment and organization for carrying on this work enable us to assure efficient and satisfactory service to all former Worthington customers in the above mentioned lines and it is on this basis that we solicit their continued patronage and good-will.

"Special attention will be given to the prompt shipment of repair and spare part orders and users of these classes of Worthington machinery may feel assured of adequate service in every requirement."

Secretary Hoover Says Store Coal Now

WASHINGTON, D. C., May 10.—During 1923 the railways through the co-operation of the manufacturing and distributing trades and the coal operators and distributors were able to handle the national coal traffic in a most efficient manner without car shortages. This was accomplished to a considerable degree by co-operation among the trades for the purchase and storage of coal during the summer season. As you are aware, the great danger point of traffic congestion is the fall season when the combined crop, winter goods and household coal movements have always, except through last year's co-operation, combined to create a car shortage.

The fall car shortage always has the effect of increasing the price of coal and of seriously disturbing the whole economic machine. Security lies in repeating the storage performance of last year by the manufacturers of the country taking reserves of coal during the months of May, June and July, thus foregoing the necessity of coal shipments during the peak period in competition with the household movement. Outside of strike years, these summer months are universally the period of lowest bituminous coal prices.

We also have a national problem in the long view of securing cheaper coal by maintaining more regularity in the production of our coal mines through planing out its seasonal fluctuations. This can only be brought about if the consumers are willing to store coal during the low production season.

There is, therefore, every transportation and financial reason for storing coal during the next few months in preparation for the autumn need. It would be a contribution not only in the interest of the consumer but of the railways and the coal industry if we could this year produce the same successful results that your association so materially assisted in bringing about last year.

I am, therefore, asking that each producer should actively interest himself in bringing these matters to the attention of the large coal consumers from the point of view of their personal interest as well as a contribution to the mutual good of American business.

(Signed) HERBERT HOOVER.

Lime Rate Hearing

THE hearing in I&S Docket 2096—Lime rates from Eastern Trunk Line points to Pittsburgh, Penn., Youngstown, Ohio, and related points, originally scheduled for hearing at Pittsburgh before Examiner Witters has been canceled and reassigned for hearing before Examiner McGrath at the office of the Interstate Commerce Commission, Washington, D. C., May 20, 1924, at 10 o'clock a. m.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning May 12:

Central Freight Association

8400. Crushed stone. Marble Cliff, Ohio, to Piqua, Ohio. Present, 13½ cents; proposed, 90 cents per net ton.

8412. Sand and gravel. Lafayette, Ind., to Chicago, Attica and Southern railway.

	——Per net ton—— Present	Proposed
La Crosse, Ind.	$1.13	$1.00
Wilders, Ind.	1.13	1.00
Burkes, Ind.	1.13	1.00
Dunns, Ind.	1.13	1.00
Wheatfield, Ind.	1.13	.90
Zadoc, Ind.	1.13	.90
Kniman, Ind.	1.13	.90
Virgie, Ind.	1.13	.90
Fair Oaks, Ind.	1.13	.90
Kents, Ind.	1.13	.90
Mt. Ayr, Ind.	1.13	.90
Julian, Ind.	1.13	.90
Foresman, Ind.	1.13	.90

8421. Crushed stone (in bulk) and limestone, unburned, agricultural (in bulk in open-top cars). Kankakee, West Kankakee, Lehigh and Van's Siding, Ill., to Kingsbury and Dillon, Ind. Present, 95 cents per net ton; proposed, $1 per net ton.

8426. Crushed stone. White Sulphur, Ohio, to Ohio. Present, sixth class; proposed (in cents per net ton):

To	Proposed
Peoria	80
Raymonds	80
Lunda	80
West Mansfield	80
Horton	80
Ridgeway	80
Mentzer	80
Kenton	80
Bucyrus	80
New Winchester	80
Martel	80
Climax	80
Fulton	80
Marengo	80
Peerless	80
Rich Hill	80
Centerburg	80
Groton	80
Johnstown	80
Alexandria	80
Clemens	80
Granville	80
Central City	80
Hebron	90
Lakeside Park	90
Millersport	90
Thurston	90
New Salem	100
Thornville	100
Walser	100
Yost	100
Glenford	100
Glass Rock	100
Mt. Perry	100
Fultonham	100
White Cottage	100
Elizabeth	100
Darlington	100
Zanesville	100
Dipple	80
Arnold	80
Dublin	80
Amlin	80
Highway	80
Columbus	80
Brice	90
Pickerington	90
Hurley	90
Basil	90
Baltimore	90
Pleasantville	100
Rushville	100
Bremen	100
Flagdale	100
Junction City	100
New Lexington	100
Clay Bank	100
Moxahala	100
Rendville	100
Corning	100
Burr Oak	110
Palos	110
Glouster	110
Trimble	110
Jacksonville	110
Millfield	110
Chauncey	110
Cocking	110
Armitage	110
Athens	110

8427. Gravel and sand (other than blast, engine, foundry, glass molding or silica). Attica, Ind., to Vollentine, Calloway, Kincaid, Humphrey, Sicily, Pawnee, Pawnee Junction, Beechley and Auburn, Ill. Present, $1.37 per net ton to Vollentine, Ill., and $1.39 to the other destinations; proposed, $1.01 per net ton.

8430. Articles taking lumber rates, B. & O. main line stations; viz., Weiant, Ohio, to Stewartsville, Ohio, to Sorel, Quebec. Proposed, 48½ cents.

New England Freight Association

6340. Sand, building common or run of bank. Walpole Heights, Mass., to Forestdale, R. I. 3. Reason: To meet motor truck competition.

6359. To establish reduced mileage basis of commodity rates on sand and gravel, carloads, between stations on Northern and Southern divisions of C. V. railway, based on approximately 20 cents per ton over rates in effect locally on B. & M. R. R. in their I. C. C. A-2472.

6395. Sand, common (not molding, fire, filter or blasting); sand and gravel (run of the bank or screened); minimum weight 90% of marked capacity of car, except when cars are loaded to cubical or visible capacity, when actual weight will apply. Ashland, Mass., to Auburndale, Boston (Huntington avenue), Brighton, Brookline, Cambridge, Cambridgeport, Chelsea, East Boston, East Cambridge, Everett, Framingham, Newton, Wellesley and West Newton, Mass., 2½ cents. Reason: To place Ashland on same basis as East Holliston and Holliston.

6396. Crushed stone. carloads, minimum weight 90% of marked capacity of car; except when car is loaded to cubical or visible capacity, actual weight will apply from Greenfield, Mass., to Dwight and Amherst, Mass., $1.15 net ton. Reason: To permit movement of traffic.

6399. Sand. Carloads, minimum weight 50,000 lb., E. Swanton, Vt., to Highgate, Vt., $1.05 net ton. Reason: Comparable with rates in effect for like joint haul movement and for similar distance.

Southern Freight Association

13642. Lime. Carloads, minimum weight 50,000 lb., from Pine Hill, Ky., to California, Ohio. Present, $4 per net ton (Cincinnati combination); proposed, $3.37 per net ton, same as rate from other Southern points, such as Crab Orchard, Knoxville, Sherwood, Tenn., Dargin and Fort Payne, Ala.

13643. Gravel. Carloads, from Coosada, Prattville Junction, Jackson's Lake and Montgomery, Ala., to Anniston, Ala. It is proposed to reduce present rate to 90 cents per net ton, or the same as the rate in effect on sand, carloads.

13661. Sand and gravel. Carloads, from C. & W. C. railway gravel pits in South Carolina to Central of Georgia railway, Tybee division stations. Present, $1.50 per net ton, based 33 cents per ton over rate to Savannah, Ga.

13662. Sand or gravel. Carloads, the property of federal, state, county or municipal government, when consigned to such government or an officer thereof, minimum weight, 10% less than marked capacity of car, from Crane Creek, Miss., to Gulfport, Miss. (when for beyond and applicable only to Mississippi intrastate traffic). Present, $1.10 per net ton (Lumberton, Miss., combination); proposed, 85 cents per net ton. Proposed rate is for the purpose of enabling shippers at Crane Creek, Miss., to meet the competition of other roadway material shippers on shipments destined to stations on the Gulfport & Mississippi Coast Traction Co. and L. & N. R. R. stations in Mississippi.

13674. Sand. Carloads, from Red Bay, Ala., to Atlanta, Ga. Present, $2.03 per net ton; proposed, $1.80 per net ton, based on carriers' proposed joint line scale for distance of 285 miles.

13684. Cement. Carloads, from Richard City, Tenn., to Decatur, Ga. (When for delivery on sidings located in switching limits of Atlanta, Ga., as designated by N. C. & St. L. Ry. Terminal Trf., I. C. C. 2896A.) Present, 12 cents; proposed, 10½ cents per 100 lb., same as rate to Atlanta, Ga.

13717. Cement, acidulated. Carloads, minimum weight 40,000 lb., from Knoxville, Tenn., and Atlanta, Ga., to Copperhill, Tenn. Class rates (sixth class) now apply. Proposed, from Knoxville, 16 cents; from Atlanta, 18 cents per 100 lb. The proposed rates, it is thought, compare favorably, distance considered, with rates from Charlotte, N. C., to Southern points.

13731. Cement. Carloads, from Ohio and Mississippi river crossings to Tennessee Central railway stations. It is proposed to cancel present commodity rates on cement, carloads, from Ohio river crossings, St. Louis, Mo., and Memphis, Tenn., to T. C. railway stations, permitting combination in connection with Agent Jones' Combination Trf. to apply. The proposed revision represents reductions.

13733. Slag. Carloads, from Clarksville, Tenn., to Adams, Tenn. Present, 18½ cents per 100 lb. (Class A); proposed, 90 cents per net ton, made in line with rates from and to other points on the L. & N. R. R.

13755. Stone or marble, broken or crushed. Carloads, minimum weight 60,000 lb., from Brighton, Tenn., to Ohio river crossings, Class A rates now apply. Proposed, to Cincinnati, Ohio, $2.25; to Louisville, Ky., Evansville, Ind., Cairo, Ill., and Metropolis, Ill., $2 per net ton; proposed rate to Cincinnati, same as present rate from Tate and Whitestone, Ga., with rates to other crossings named, 25 cents less than proposed to Cincinnati.

13771. Sand and gravel. Carloads, from Paducah, Ky., to Trenton, Fruitland and Humboldt, Tenn., combination rates now apply. Proposed rate, $1.20 per net ton, same as in effect from Memphis, Tenn.

13772. Gravel and sand. Carloads, minimum weight 25 net tons from Killens, Ga., to Cordele, Ga. Present rate, $1.35 per ton (Albany, Ga., combination); proposed, $1.22 per net ton, same as published by S. A. L. railway from Mitylene, Ala., to Cordele, Ga.

13787. Gravel, novaculite or ganister. Minimum weight marked capacity of car; except when cars are loaded to their visible capacity, actual weight will govern, from Elco and Gravel Pit, Ill., to Troy, Tenn. Class A rate of 28½ cents per 100 lb. now applies. Proposed, $1.21 per net ton, same as in effect to Dyersburg, Tenn.

Southwestern Freight Bureau

818. Cement, natural or portland. To establish rates on cement, natural or portland (building cement), in bulk or in packages, as provided for carload shipments in Consolidated Classifications, carloads from Kingsport, Tenn., to points in Louisiana west of the Mississippi river, based on differential of 3 cents over current rates from Richard City, Tenn. It is proposed to revise the existing rates from Kingsport to a basis that will enable the plant at Kingsport to compete with Chattanooga, Richard City and Nashville, Tenn.

828. Lime, nitrate of; soda, nitrate of. To establish rate of 41 cents per 100 lb. on lime, nitrate of; soda, nitrate of, carloads, minimum weight 50,000 lb., from Gulf ports named in Item 1 of Agent Boyd's Import Tariff 1017D to points in Arkansas and Oklahoma. The purpose of this docket is to publish as a specific commodity the class rate that now alternates.

849. Stone, crushed. To establish rate of 12 cents per 100 lb. on crushed stone, carloads, minimum weight 50,000 lb., or marked capacity of car is less than 50,000 lb., from Dittlinger, Texas, to Elizabeth, La. Shippers claim present Class E rate is prohibitive and will not permit movement.

873. Stone, gravel, etc. Make the distance commodity rates published in Item 4104, S.W.L. Trf. 26X, on stone, gravel, etc., from Oklahoma points to Texas points apply northbound, further extending scale to 750 miles as shown in Rate Notice 8482. Shippers at several points in Texas claim they cannot market their products in the state of Oklahoma due to the fact that the present rates are too high.

893. Stone, crushed. To amend paragraph B, Item 306, S.W.L. Trf. 55G, applying between points in Oklahoma on intrastate traffic to include the following commodities: Crushed stone in bags; magnesium chloride, not to exceed 20% of the total weight of stucco, may be included in shipments containing stucco at the stucco rate and minimum weight. It is desired that the same

provision be made effective on Oklahoma intrastate traffic as has been made in connection with interstate traffic.

895. Lime. To establish the following rates in cents per 100 lb. on lime. Carloads, minimum weight 30,000 lb., from Springfield, Mo., on Missouri Pacific R. R., and Eugene, Mo,, on C. R. I. & P. railway, to Bridgeport, Okla.; also Ashgrove, Galloway, Springfield, Mo., and other Group 1 points on the St. L. S. F. railway to Ralph, Okla., 33½ cents.

905. Sand, gravel, chats and related commodities. To provide for mileage rates on sand, gravel, chats and related commodities as described in Item 750A of S.W.L. Trf. 114A, between defined territories and points in Arkansas, Louisiana, etc., as shown in S.W.L. Trf. 114A by extending column 1 rates, S.W.L. Trf. 114A, up to and including 800 miles, observing same graduation beyond 600 miles as exists in the last 100 mile block of the present scale. The extension of the scale is proposed in order to enable shippers of chats, crushed stone, etc., in the Southwestern district to reach all points in Louisiana.

Texas-Louisiana Tariff Bureau

5974-TX. Lime. Carload rates on, from Dittlinger, McNeill and Round Rock, Texas, to Ft. Worth and Dallas, Texas. Proposition from shippers to establish on lime, carloads, minimum weight 40,000 lb., from Dittlinger, McNeill and Round Rock, Texas, to Ft. Worth, per 100 lb. As these two commodities are highly competitive building materials, having about the same f.o.b. plant value, and while they differ somewhat chemically, there is not much difference between them physically; therefore, shippers request same rates as currently applicable on lime.

Trunk Line Association

11967. To cancel commodity rates on lime. Carloads, from all Valley Railroad of Virginia stations to points in Florida, Georgia, North Carolina, South Carolina and Virginia, account of rates being obsolete, classification basis to apply.

11968. Stone, crushed (will not include agricultural limestone or ground limestone, unburnt, or fluxing stone or fire stone) Carloads, minimum weight 90% of marked capacity of car; except when car is loaded to cubical or visible capacity, actual weight will apply, from Birdsboro, Penn., to Howell, N. J., and Farmingdale, N. J., $1.40 per net ton.

Western Trunk Line

1825B. Sand and gravel. Carloads, from Eau Claire, Wis., to Duluth, Minn., and Superior, Wis. Present, to Duluth, 7 cents; Superior, 6½ cents per 100 lb. Proposed, to Duluth, 6 cents; Superior, 5½ cents per 100 lb. Minimum weight, 90% of marked capacity of car, but not less than 40,000 lb.

2271B. Stone (broken, crushed, ground, fluxing, rip rap, rubble) or stone quarry strippings. Carloads, from Dell Rapids and Sioux Falls, S. D., to Charles City and New Hampton, La. Present, Charles City, 9½ cents; New Hampton, 11½ cents per 100 lb. Proposed, 8½ cents per 100 lb. Minimum weight 90% of the marked capacity of the car, but not less than 50,000 lb.

3834. Stone, natural, crushed, broken, ground, chipped, rip rap and rubble. Carloads, from Kansas City, Leeds, Mo., Morris, Kan., and Pixleys, Mo., etc., to points within the Kansas City, Mo.-Kan., switching districts, as shown in W.T.L. Trf. 154D, I.C.C. A1356. Present, between Kansas City, Pixleys, Morris, etc., to points within the Kansas City, Mo.-Kan., switching district, on stone, carload. Proposed, to add broken, chipped, rip rap and rubble stone to the present description. Minimum weight, marked capacity of car, but not less than 60,000 lb., except where car of less than 60,000 lb. capacity is furnished at carriers' convenience, actual weight will apply when loaded to full visible capacity.

3836. Marble, crushed or broken, and stone paving blocks, also crushed stone as described in Item 4280, W.T.L. 1-0, I.C.C. A1408, and Item 6690, W.T.L. 50K, I.C.C. A1372, from Kenosha, Wis., to Missouri river points and Logan, Iowa. Present, on stone, except crushed stone, straight carload, 13½ cents; proposed, to cancel commodity rate and allow class rate to apply.

496B. Limestone, ground. Carloads, from Weeping Water, Neb., to Kansas City, Mo.-Kan., Atchison, Kan., Leavenworth, Kan., and St. Joseph, Mo., and Leavenworth, Kan., and 5 cents per 100 lb. to Atchison, Kan. Minimum weight, 90% of marked capacity of car; except when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply, but in no case shall the weight be less than 40,000 lb.

3842. Sand and gravel. Carloads, from Ottawa, Ill.

To	Distance, Miles	Present Class	Proposed Net ton
Goose Lake, Iowa	130	E	$1.40
Bryant, Iowa	130	E	1.40
Charlotte, Iowa	138	E	1.40

Minimum weight, 90% of marked capacity of car; except when car is loaded to full visible capacity, actual weight shall apply.

3845. Stone, broken, crushed, ground or fluxing. Carloads, from Osage, Iowa, to Mankato, Minn. Present, 11½ cents; proposed, 8½ cents. Minimum, 90% of marked capacity of car, but not less than 50,000 lb.

3847. Sand. Carloads, from St. Charles, Mo., to St. Louis, Mo. Present, 65 cents per net ton; proposed, 50 cents per ton (not to include any switching). Minimum, 90% of marked capacity of car, but not less than 60,000 lb., except when cars are loaded to full visible or space-carrying capacity, in which case actual weight will govern.

3437B. Stone, crushed, sand and gravel. Carloads, from Buffalo and Linwood, Iowa, to C. R. I. & P. railway stations in Missouri. Present and proposed, to a few points representative of the situation.

To	Buffalo, Iowa		Linwood, Iowa	
C. R. I. & P. Ry.	Present	Proposed	Present	Proposed
Mercer, Mo.	$2.40	$1.55	$2.40	$1.55
Trenton, Mo.	2.70	1.70	2.70	1.70
Altamont, Mo.	2.80	1.80	2.80	1.80
Weatherby, Mo.	3.10	1.80	3.10	1.80
St. Joseph, Mo.	3.20	1.90	3.20	1.90
Cameron, Mo.	3.10	1.80	3.10	1.80
Edgerton Jct, Mo.	3.20	1.90	3.20	1.90
Beverly, Mo.	3.20	1.90	3.20	1.90
Lathrop, Mo.	3.10	1.85	3.10	1.85
Kansas City, Mo.	3.20	1.90	3.20	1.90

Lecture on Heat Transfer and High Temperature Insulation

DURING the present school year, a lecture on "Heat Transfer and High Temperature Insulation," prepared by the engineering department of the Celite Products Co., Chicago, is being given before the various engineering classes at approximately 50 of the large universities throughout the country.

The lecture is illustrated with 25 lantern slides, showing curves on conductivities of various materials, charts showing heat losses through various wall constructions in heated equipment, photographs of insulated equipment under construction, etc.

Printed copies of the lecture with the illustrations included, are distributed among the students for their records and these printed copies are also available for general distribution to anyone interested in this subject.

Schedule is now being arranged for delivery of the lecture during the 1924-5 school year.

Colloids in Limestone

By John C. Schaffer
Pittsburgh, Penn.

SIR: I have read R. W. Stone's article on the "Source of Limestone" with great interest. This is a subject that I have been endeavoring to present to the lime manufacturers for a number of years and I am, naturally, pleased to see it covered so thoroughly and in a way that it leaves no room for argument.

It would have been gratifying had this writer said something of the origin of colloidal matter contained in limestone. He passed this up very gracefully by assuming that the scavengers devoured the entire amount of animal matter contained in these shells. This would lead us to believe some of the old tales of the wolves devouring each one of the pack that had been killed until there was only one wolf left. So the last wolf, when killed, contained the entire pack in a condensed and collected form. So be it with the scavengers, which must have died sometime. However, experiments that I have conducted show conclusively that a certain amount of this animal matter or gelatinous substance remained in the shell deposits and so form a part of the stone.

It has, likewise, been found that when scientific principles are employed in calcining the rock, it is decarbonated, just the same as the lime, and left in a form that it can be hydrated and brought back to a gelatinous substance, providing it is subjected to the proper conditions while hydrating. It not only requires the proper conditions for hydrating to develop this substance, but it, likewise, requires a condition that will not permit it to revert to a gluey substance when drying.

This is the substance in lime that has been responsible for the terms "fat" and "lean" lime, that are so commonly used, and which expressions are more correct than any that could have been applied. This gelatinous substance in lime is not only very beneficial in the way of making it work smoothly, but it, likewise, has considerable influence on the hardening qualities of the lime when used for mortar or plaster purposes. This substance is, also, responsible for lime being "tacky" when improperly treated in calcining and hydrating, on account of its tendency to form a gluey substance, instead of a gelatinous substance, if not receiving the proper treatment throughout the process of manufacture.

As the gelatinous substance is present in varying quantities in different deposits, it and the texture of the shells forming the deposit are responsible for the varied qualities of lime from the many different deposits.

Discover New Vein in California Gypsum Mine

WITH the opening of a new 60-ft. vein at the gypsum mine at Mint Canyon, which is situated near Girard, Calif., employment for more than 75 men will be available at once.

Extensive development work in the mine led to the discovery of the new vein which company officials say will necessitate the installation of new machinery and other improvements.

The valuable mineral is being taken from the mine in large quantities, most of which is being shopped to Los Angeles. As soon as the new machinery arrives and is placed in practical use work in the mine will be carried on at full capacity rate. The gypsum is used for plaster.—*Girard (Calif.) News.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.40	.....
Prospect, N. Y.	.80	1.40	1.40	1.30	1.30	.....
Walford, Pa.	.....	.....	1.30	1.45	1.55	1.55
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.75	.....	1.75	1.50	.....	.....
Buffalo, Iowa	.90	.....	1.30	1.10	1.15	1.15
Cypress, Ill.	1.20	1.35	1.35	1.20	1.20	1.10
Dundas, Ont.	.75	1.00	1.00	1.00	.90	.90
Gary, Ill.	1.10	1.40	1.10	1.10	1.10	1.10
Greencastle, Ind.	1.25	1.25	1.15	1.05	1.05	1.05
Lannon, Wis.	.80	1.00	1.00	.95	.95	.95
St. Vincent de Paul, P. Q.	.75	1.25@1.45	1.10	1.00	1.00	1.00
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.40	1.30	1.25	.....
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada	1.90‡	2.25‡	2.25‡	2.25‡	2.00‡	2.00‡
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
Youngstown, Ohio	.....	.....	1.30	1.55	1.55	1.55
SOUTHERN:						
Alderson, W. Va.	.75	1.75	1.75	1.60	1.50	.....
Bridgeport and Chico, Texas	1.00@1.25	1.50@1.60	1.30@1.40	1.25@1.35	1.25@1.35	1.25@1.30
Cartersville, Ga.	1.75	1.50	1.50	1.15	1.00	.....
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Graystone, Ala.		Crusher run with fines out, 1.00 per net ton				
Graysville, Ga.	1.00	.90@1.00	.....	.90@1.00	.80@1.00	.....
Rock Crusher, Ky.	1.50	1.25	1.25	1.25	1.25	1.15
Russellville, Ala.	1.25	1.25§	1.50a	1.15§	1.00a	1.00
WESTERN:						
Atchison, Kans.	.50	.....	2.00	2.00	2.00	1.60||
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	.....
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.35@1.40	1.35@1.40
Dresser Junction, Wis.	1.00	1.00	2.25	2.00	1.75	.....
El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
E. Summit, N. J.	1.50	2.00	1.80	1.40	1.40	.....
Eastern Maryland	1.10	1.75	1.70	1.60	1.50	1.50
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.75	1.70	1.60	1.50	1.50
Meriden, Middlefield, New Britain, Rocky Hill, Conn.	.60	1.60	1.35	1.15	1.00@1.10	1.00
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Springfield, N. J.	1.80	2.00	2.00	1.70	1.50	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.	.50	.....	2.00	.....	1.60	.....
Eastern Penna.—Sandstone	1.25	1.65	1.60	1.40	1.40	1.25
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.	.75	2.00	1.75	1.25	1.25	.....
Middlebrook, Mo.—Granite	.....	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	.....

*Cubic yd. †1 in. and less. ‡Prices include 90c freight. ||Rip rap per ton. §Dust in. (a) Dust out.

Agricultural Limestone

(Pulverized)

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers 5.00

Hillsville, Pa.—Analysis, 94% $CaCo_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; 94% thru 50 mesh; sacks, 5.00; bulk 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk 2.50

Watertown, N. Y.—Analysis 96-99% $CaCo_3$; 0.02% $MgCo_3$—90% thru 100 mesh, bags, 4.50; bulk 3.00

Rockdale, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

North Pownal, Vt. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

West Stockbridge, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 100% thru 4 mesh; 80 lb. paper sacks, 5.00; bulk 3.50

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 ..... 2.10@ 2.25

100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk 3.50

100% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Mayville, Wis. 2.35

Cartersville, Ga. — Pulverized limestone 2.50

Knoxville, Tenn.—75% thru 100 mesh, bags, 3.95; bulk 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk 2.75

Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk 4.00

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98½% $CACO_3$, ½% $MgCO_3$; 90% thru 10 mesh, 30% thru 100 mesh ..... 1.50@ 2.00

Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Blackwater, Mo.—96% $CaCO_3$; 100% thru 8 mesh 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh 1.50

Carthage, Mo. — Analysis, 98½% $CaCO_3$; 100% thru 10 mesh, 30% thru 100 mesh 1.75

Alton, Ill.—Analysis 99% $CACO_3$; 100% thru 4 mesh 1.75

Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 100 mesh 1.10

Cypress, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 50% thru 50 mesh 1.25

Kansas City, Mo.—50% thru 100 mesh 1.25

Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$ —50% thru 100 mesh; 50% thru 4 mesh 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 85% thru 10 mesh; 53% thru 50 mesh; 40% thru 100 mesh (meal) bulk	1.60
32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% 4 mesh (screenings) bulk	1.25
Milltown, Ind. — Analysis, 91.95% $CaCO_3$, 4.87% $MgCO_3$; 36% thru 100 mesh, 43.2% thru 50 mesh	1.45@ 1.60
Monroe, Mich.—Analysis, 51.91% $CaCO_3$, 44.17% $MgCO_3$; agricultural limestone meal, 3/16 in. to dust, 30% thru 100 mesh	1.60
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Bridgeport, Texas: Screenings from ⅛ in. down to flour	1.50
Chico, Texas: Screenings from ⅛ in. down to flour	1.50
Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass: 6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.50@ 1.75
Hancock, Md.—Damp	1.50
Dry	2.00
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.	2.25@ 2.50
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Millville, N. J.	2.00
Mineral Ridge, Ohio	2.50
Ottawa, Ill.	1.25@ 1.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Pa.—Dry	4.00
Damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	1.50@ 3.00
South Vineland, N. J.—Damp	1.75
Dry	2.25
Thayers, Pa.	2.50
Utica, Ill.	1.25@ 1.50
Zanesville, Ohio	2.50
Foundry Sand:	
Albany, N. Y.:	
Molding fine, brass molding	2.50
Molding coarse	2.25
Sand blast	4.00
Arenzville, Ill.—Molding fine	1.50@ 1.70
Brass molding	1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Columbus, Ohio:	
Core	.25@ .35
Furnace lining	2.00@ 2.50
Molding fine	1.50@ 2.00
Molding coarse	1.50@ 1.75
Sand blast	3.50@ 5.00
Stone sawing	1.50
Traction	.25@ 1.00
Brass molding	2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	1.15	.85	.85	.85
Attica, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95	.....	.....	.85	.....
Farmingdale, N. J.	.48	.48	.75	.....	1.10	.....
Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Machias, N. Y.	.75	.75	.75	.75	.75	.75
Pittsburgh, Pa.	1.25	1.25	1.15	.85	.85	.85
Washington, D. C.—Rewashed, river	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.....	.60	.....	.70	.70	.....
Beloit, Wis.	.....	.70	.....	.....	.80	.....
Columbus, Ohio	.85	.85	.75	.75	.75	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
Eau Claire, Wis.		Unwashed ballast, .50 ton				
Elkhart Lake, Wis.	.40	.40	1.35	.....	.....	.85
Grand Rapids, Mich.	.55	.40	.50	.50	.50	.50
Hamilton, Ohio	.50	.50	.....	.80	.....	.70
Hersey, Mich.	.....	1.00	.....	.....	1.00	.....
Indianapolis, Ind.	.50	.50	.....	.....	.....	.75
Janesville, Wis.	.60	.60	.....	1.50	.75@1.00	.75@1.00
Mason City, Iowa	.....	.65@ .75	.....	.....	.65@ .75	.....
Mankato, Minn.	1.00	.45@ .55	1.35@1.55	1.45@1.55	1.45@1.55	1.45@1.55
Milwaukee, Wis.	.40a	.40	.50	.....	1.25	.....
Moline, Ill.	1.11	1.11	1.36	1.36	1.36	1.36
Moronts, Ill.	.60@ .80	.60@ .80	1.20@1.50	1.20@1.50	1.20@1.50	1.20@1.50
Oregon, Ill.	.50@ .80	.50@ .80	.60@ .90	.60@ .80	.60@ .80	.60@ .80
Ottawa, Ill.	.50@ .80	.50@ .80	.60@ .90	.60@ .80	.60@ .80	.60@ .80
Palestine, Ill.	.50@ .80	.50@ .80	.60@ .90	.60@ .80	.60@ .80	.60@ .80
St. Louis, Mo., f.o.b cars	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	1.20	1.45	1.65§	1.45	.....	1.45‖
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	.75	.60	.90	.90	.90	.85
Winona, Minn.	.50	.50	.80	.80	.80	.80
Yorkville, Ill.	.40	.40	1.25	1.10	1.00	1.00
Zanesville, Ohio	.50@ .80	.50@ .80	.60@ .90	.60@ .80	.60@ .80	.60@ .80
	.70	.....	.60	.....	.90	.....
SOUTHERN:						
Brookhaven, Miss.; Roseland, La.	.50	.....	.....	.....	.85	.....
Charleston, W. Va.	all sand 1.37 f.o.b cars		all gravel 1.47 f.o.b. cars			
Knoxville, Tenn.	1.00	1.20	1.35	1.20	1.20	1.20
New Martinsville, W. Va.	1.00	1.00	1.20a	.....	.....	.80
WESTERN:						
Baldwin Park, Calif.	.....	.25@ .40	.50@ .70	.....	.50@ .70	.....
Kansas City, Mo.		Kaw river sand .75 per ton f.o.b. plants				
Los Angeles, Calif.	.70	.70	1.10@1.15	.....	1.10@1.15	.....
Pueblo, Colo.	1.10*	.90*	.....	1.75*	.....	1.60*
San Diego, Calif.	50@ .65	.80@ .90	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*
Webb City, Mo. (flint)	.75	.75	.25@ .75b	.85b	1.25c	1.15c

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Brookhaven, Miss., Rosel'd, La.	.75	.50	.....	.....	1.25	.....
Dudley, Ky.‡	1.05	1.05	.....	1.00	.....	.....
East Hartford, Conn.			Sand, .65 per cu. yd.			
Elkhart Lake, Wis.	.60	.50	.....	.....	.....	.....
Fishers, N. Y. (filter sand)	.75	.60@ .75	.....	.60	.....	.....
Gainesville, Texas	.....	.95	.....	.....	.....	.55
Grand Rapids, Mich.	.....	.....	.....	.50	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	.70	.....
Hersey, Mich.	.....	.....	.....	.55	.....	.....
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas	.....	.....	.....	.....	.....	.55
Mankato, Minn.			Pit run gravel, .60			
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	.....	.....	.....	.....	.....	.60
St. Louis, Mo.	.....	.....	.....	.....	.....	1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Pa.	1.10	1.10	(crushed rock)			
Zanesville, Ohio	.....	.60	.....	.....	.....	.....

*Cubic yd.; †pebbles; §¾ in. and less; ‡crushed rock; ‖2½ in. and less; (a) ¾ in. and less; (b) flint chats; (c) crushed flint.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.:		
Molding fine		2.00
Molding coarse		1.90
Brass molding		2.15
Dunbar, Pa.:		
Traction (Mill)		2.25
Eau Claire, Wis.:		
Sand blast		3.25
Traction		.40
Franklin, Pa.:		
Core		2.00
Furnace lining		2.50
Molding coarse		2.00
Brass molding		2.75
Joliet, Ill.:		
No. 2 molding sand and loam for luting purposes; milled		.85
Bank run		.65
Kasota, Minn.:		
Stone sawing (white glass sand)	1.50@	2.00
Mapleton Depot, Pa.:		
Molding coarse		2.25
Molding fine		2.50
Traction	2.00@	2.25
Roofing sand		2.25
Massillon, Ohio:		
Molding fine, coarse, furnace lining and core		3.00
Traction		2.50
Michigan City, Ind.:		
Core	.50@	.55
Traction		.40
Millville, N. J.:		
Core		2.00
Mineral Ridge, Ohio:		
Core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding (all green)		2.00
Montoursville, Pa.:		
Core	1.25@	1.40
Traction		1.10
Brass molding		1.40
New Lexington, Ohio:		
Molding fine		2.00
Molding coarse		1.50
Ottawa, Ill.:		
Crude silica sand	.85@	1.00
Core, furnace lining, steel molding		1.50
Roofing sand	1.50@	4.50
Sand blast		4.50
Ottawa, Minn.:		
Crude silica sand	.75@	1.00
Pacific, Mo.:		
Core, furnace lining	1.00@	1.25
Molding fine	.90@	1.00
Stone sawing	1.00@	1.75
Molding coarse	.85@	1.00
Ridgway, Pa.:		
Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Rockwood, Mich.:		
Roofing sand		3.00
Sand blast		3.75
Round Top, Md.:		
Sand blast		2.25
Traction		1.75

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.35	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, O.	2.05	1.45	1.45	1.45	1.45	1.45	1.45
Jackson, O.		1.30	1.30	1.30	1.30	1.30	1.30
Toledo, O.	1.50	1.35	1.50	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55	1.55	1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Bellefonte, Pa.		10.50*	10.50*	10.50*	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Lime Ridge, Pa.							5.00a	
Williamsport, Pa.			10.00				6.00	
York, Pa. (dealers' prices)		10.50	10.50	10.50			8.50	1.65b
CENTRAL:								
Cold Springs, Ohio		11.00	10.00		9.00	11.00‖	10.00	
Delaware, Ohio	12.50	10.00	9.00	11.00			9.00	1.60
Gibsonburg, Ohio	12.50				9.00			
Huntington, Ind.		11.00	10.00		9.00	11.00	10.00	1.60c
Luckey, Ohio	12.50‡							
Marblehead, Ohio		11.00	10.00				10.00	1.60d
Marion, Ohio		11.00	10.00				10.00	1.80†
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70e
Sheboygan, Wis.							9.50	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, Ohio	12.50‡	11.00‡	9.50‡	13.50	9.00	10.00	9.00	1.60
SOUTHERN:								
Erin, Ten.							8.50	1.50
El Paso, Texas							9.00	1.50
Graystone and Wilmay, Ala.	12.50	11.00				.67½g	8.50	1.50
Karo, Va.							7.00	1.50
Puntenny, Ariz.					10.00h	.90i	9.50h	1.70j
Staunton, Va.							1.50	
Varnons, Ala.	11.00	11.00	11.00	11.00		8.50	8.50	15.00f
Zuber and Ocala, Fla.	13.00	13.00	10.00			1.50	12.00	1.60
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							15.00	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.50
Tehachapi, Calif.							13.00	2.10e

*Paper sacks; †180-lb. net, non-returnable metal barrel; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; (a) f.o.b. kilns; (b) 180 lb. net, 2.65, 280 lb. net; (c) wooden bbl; (d) wooden, 1.60, steel, 180; (e) wooden bbl., steel bbl., 2.20; (f) ton; (g) per bag of 90 lb.; (h) to 12.50; (i) to 1.00 90-lb. sack, 25c credit if returned; (j) to 2.10.

Miscellaneous Sands

(Continued)

St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50
Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried)—Core, molding fine, roofing sand and brass molding.. (Direct from pit)	3.00@	3.50
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
Tamalco, Ill.:		
Molding coarse	1.40@	1.60
Brass molding		1.75
Thayers, Pa.:		
Core		2.00
Furnace lining		1.25
Molding fine and coarse		1.50
Traction		2.00
Utica, Ill.:		
Core		.75
Furnace lining	1.00@	1.50
Molding fine		.75
Molding coarse		.85
Roofing sand		1.25
Sand blast		2.50
Stone sawing	1.25@	2.50
Traction		1.25
Brass molding	.65@	1.25
Warwick, Ohio:		
Core, furnace lining, molding fine and coarse (all green), 1.75; all dry		2.50
Traction		2.50
Zanesville, Ohio:		
Molding fine	1.50@	1.75
Brass molding	1.50@	1.75
Molding coarse		1.50
Furnace lining, molding steel		2.00
Traction		2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.:		
Crude talc (grindings)		4.00
Ground (150-200 mesh)	8.00@	12.00
Pencil and steel workers' crayons, per gross	1.10@	2.50
Chester, Vt.:		
Ground (150-200 mesh)	8.50@	10.00
Including bags	9.50@	11.00
Emeryville, N. Y.:		
(All air floated)—325 mesh, bags		14.75
200 mesh, bags		13.75
Henry, Va.:		
Crude talc (mine run) per 2000-lb. ton	2.75@	3.50
Ground (150-200 mesh), bags	9.75@	14.00
Keeler, Calif.:		
(150-200 mesh); carloads, 6000-lb. (bags extra)	18.00@	30.00
Marshall, N. C.:		
Crude (gray)	4.50@	5.00
Ground (60-80 mesh) (bags extra)	6.50@	7.50
Ground talc (150-200 mesh); bags	8.00@	12.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), 200-lb. bags	13.00@	15.00
Vermont:		
Ground talc (20-50 mesh); bags	7.50@	8.50
Ground talc (150-200 mesh); bags	10.00@	16.00
Waterbury, Vt.:		
Ground talc (20-50 mesh), bulk (Bags extra)	7.50@	10.00
Ground talc (150-200 mesh), bulk (Bags extra)	10.00@	22.50
Pencils and steel workers' crayons, per gross	1.20@	2.50

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%, bags		8.50
Bulk		6.50
Gordonsburg, Tenn.—B.P.L. 68-72%..	5.50@	6.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Mt. Pleasant, Tenn.—B.P.L. 65%; carloads, bulk	6.00@ 6.50
Less than carload lots	7.50
Twomey, Tenn.—B.P.L. 65%	6.50@ 7.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	2.25
70% min. B.P.L.	2.50
72% min. B.P.L.	2.75
75/74%	3.75
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

Per Ton

Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	20.00@22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00@23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Easton, Pa.—Slate granules		7.00
Haddam, Conn. — Felstone buff	12.00	12.00
Harrisonburg, Va.—Blk. marble (crushed, in bags	12.50@18.00	12.50@18.00
Ingomar, Ohio (in bags)		6.00@25.00
Mertztown, Pa. (granite) bags, $10.00; bulk		8.00
Middlebrook, Mo.—Red		25.00@30.00
Milwaukee, Wis. (del.)		16.00@30.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.— 2000 lb.		8.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

Concrete Brick

Prices given per 100 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Carpenterville, N. J.	23.00	31.50@41.50
Ensley, Ala. ("Slagtex")	11.50	22.50@33.50
Friesland, Wis.	21.00	32.00
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del.)	21.00	45.00@55.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
Salem, Ore.	23.00	35.00@75.00
Watertown, N. Y.	18.00@21.00	32.00@35.00
Wauwatosa, Wis.	15.00@16.00	28.00@75.00
Winnipeg, Can.	15.50	

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	13.00
Plant City, Fla.	10.00@15.00
Portage, Wis.	15.00
Rives Junction and Saginaw, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Tex.	12.50@14.00
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	17.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	22.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	.....	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.60	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.60
Boston, Mass.	.....	2.53@3.03†
Buffalo, N. Y.	.....	2.38@2.88†
Cedar Rapids, Iowa	.60	2.40
Cincinnati, Ohio	.61¾	2.47
Cleveland, Ohio	.59¾	2.39
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	.59¾	2.39
Dayton, Ohio	.....	2.45
Denver, Colo.	.63¾	2.55
Detroit, Mich.	.60	1.995@2.40
Duluth, Minn.	.54¾	2.25
Indianapolis, Ind.	.60¼	2.41
Kansas City, Mo.	.64¼	2.37
Los Angeles, Cal. (less 5c dis.)	.68	3.08
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	2.25
New Orleans, La.	.....	2.90
New York, N. Y.	.....	2.15@2.65†
Philadelphia, Pa.	.....	2.41@2.81†
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Pa.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Toledo, Ohio	.61¼	2.005@2.45

NOTE—Add 40c per bbl. for bags.
*5c cash disc. 10 days.
†Prices to contractors, including bags.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.10
El Paso, Tex.	.70	2.08*
Hannibal, Mo.	.....	1.95
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	1.95
Los Angeles, Calif.	.....	2.65
Louisville, Ky.	.....	2.35
Northampton, Pa.	.....	1.95
Phoenix, Ariz.	.....	4.30†
Steelton, Minn.	.50	2.00
Universal, Pa.	.48¾	1.95

*Gross, 10c sacks and 10c per bbl. disc 10 days
†Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Black Hawk, S. D.	3.50	.....	7.00	8.00	10.00	10.50	.....	.....	.....	.....	.....	.....	.....
Denver, Colo.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	.....	6.00	.....	15.00	.....	.....	.....	.....	15.50	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	2.75	6.00	6.00	7.25@10	10@11	10@11	.....	.....	30.00	.....	22.00	23.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00*	30.75	21.00	19.37	20.00	30.00
Port Clinton, Ohio	3.00	4.00	6.00	8.00	10.00	10.00	.....	7.50	30.15	.....	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	12.00	12.00	15.40†	.....	.....	16.40‡	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

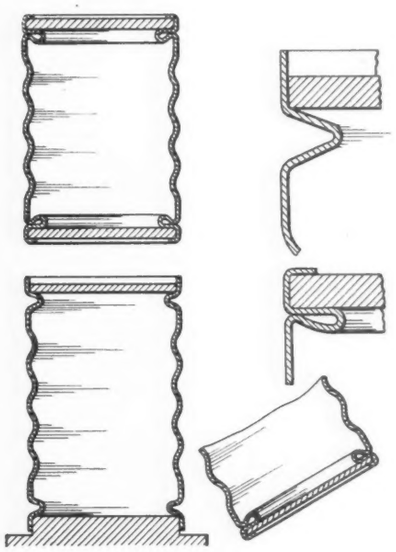
NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Sanded Wood Fiber $2.50 per ton additional; †CL.; LCL., $16.50; ‡finishing, CL.; LCL., $17.50.

New Machinery and Equipment

Pratt Lime Barrel

H. D. PRATT'S many friends in the lime industry will be interested to know that his inventive brain has been busy recently and that he has not lost his contact with the lime industry since leaving the Link-Belt Co. His latest invention is a steel-shell lime barrel with wooden heads.

The essential details of this barrel are shown in the accompanying drawings. The corrugated-steel shell is shipped knocked down and can be readily assembled with the simplest kind of machinery. To put the heads on, the open-end of the barrel is put



Lime barrel invented by H. D. Pratt showing how hollow ring is formed top and bottom giving great strength and rigidity

forming a hollow ring or hoop at both top and bottom of the barrel. This gives the barrel great strength and rigidity, for a hollow ring is the stiffest kind of a metal shape.

The barrel has been made and extensively experimented with at the plant of the Tobey Lime Co., West Stockbridge, Mass., of which M. H. Deely is president and J. M. Deely, secretary and treasurer.

This company has just completed a new modern rotary kiln lime plant, of which Mr. Pratt was the designing and erecting engineer. A description of this plant will appear in an early issue of ROCK PRODUCTS.

Agitating Slurry

THE orthodox methods of stirring slurry are two. The most widely used method consists of a large paddle with blades set over a ring or die on the floor and the other head inserted, the projecting edges of the shell are hammered or pressed down by a simple crimping device.

In locking on the head the special corrugation or indention under the head is closed, at an angle of 45 deg. It does not require a very vivid imagination to realize that the amount of power necessary in this operation is out of proportion to the results achieved. As a matter of fact a tank of slurry often requires 10 to 15 hp., depending on its size, to accomplish agitation by this method.

A second and quite common method of stirring is by means of air. In a 30-ft. tank air is forced upward through the slurry from a dozen to 20 pipes extending to within a foot of the bottom. Naturally the air is not applied continuously, but is turned on for perhaps five minutes every hour. This is less expensive than the first method as far as power is concerned, but it requires considerable attention from the operating men, which is, of course, a drawback.

Two newer methods have recently come to our attention which show that in some quarters at least constructive thought is being given to the problem. In one plant a screw propeller with an upward push is being installed in a 30-ft. tank. Small-scale experiments indicate that it has economical possibilities and *a priori* it would seem safe to predict a saving in power.

The other system is in use in several plants and makes use of what is substantially a Dorr agitator. In principle it consists of a tank with a slowly rotating central shaft, at the bottom of which are two radial arms carrying rakes. The latter travel near the bottom of the tank and move the settling material toward the center, where it is forced up the inside of the shaft by means of an air lift. From the top of the shaft it flows into radial troughs or launders rotating above the surface, having perforations in the bottom, from which the slurry is again distributed to the tank. Finally the charge is partly kept from settling by forcing air through it from the submerged arms carrying the rakes. This system has had considerable success in handling reaction mixtures in other industries with good results. It is claimed that the saving in power amounts to nearly 75% over the paddle stirrer.

At present both of these systems are so new that replacement and operating costs are not available, but the developments will bear watching, for the problem is one that involves a considerable item of cost.—*Chemical and Metallurgical Engineer*

Very Large Crane for Quarry and Crushing-Plant Service

THE Michigan Limestone and Chemical Co. at Rogers City, Mich., are now placing into service a special high powered "Industrial" locomotive crane, to be used for wrecking and general service in their large quarry operations.

This machine is equipped with an adjust-

Probably the largest locomotive crane in the quarry industry

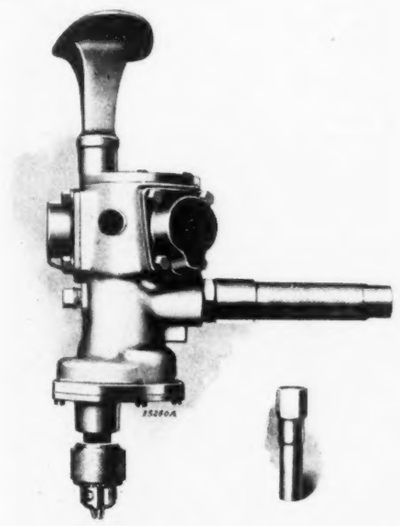
able boom for use in lengths of 50, 70 and 90 ft. having a capacity of 75 tons with a 50-ft. boom at a 20-ft. radius and 40 tons with a 90-ft. boom at a 30-ft. radius. It is especially designed to handle a 2-yd. high powered clamshell bucket in rock and coal. A photograph of this machine is shown.

There are few bucket-operating machines in use in the cement mill, pit or quarry industry of equivalent capacities to this machine. It was manufactured by the Industrial Works, Bay City, Mich.

New Size "D" Air-Operated Drill

A NEW size lightweight non-reversible pneumatic drill has been brought out by the Ingersoll-Rand Co., 11 Broadway, New York. This new drill is known as Size D and is suitable for light drilling up to 9/16-in. diameter holes, and reaming up to 5/16-in. diameter.

This is a lightweight drill which may be fitted with either breast plate, feed screw or grip handle and so made adaptable for a wide variety of work. The construction of this machine is very similar to that of the No. 6 and 600 drills which this company brought out some two years ago and which were powered for drilling up to ⅜-in. diameter. These drills proved so successful that this new size D drill



Air-operated twist drill for 9/16-in. diameter holes

of larger bore and stroke was developed.

The features of this type of machine are briefly — lightweight aluminum case, with steel bushings cast in all the bearing holes and the throttle hole; cast iron cylinders which are renewable and interchangeable, and special three-cylinder motor. The renewable cylinders are a valuable feature, as any cylinder after long service, may easily be replaced and the motor made as good as new at slight cost.

The three-cylinder motor has the rotating parts all accurately balanced, eliminating vibration and reducing wear and tear on the machine. The drill is very economical in air consumption and cost of maintenance, is high powered, and, moreover, every part is readily accessible for inspection.

The details of the Size D drill are as follows:

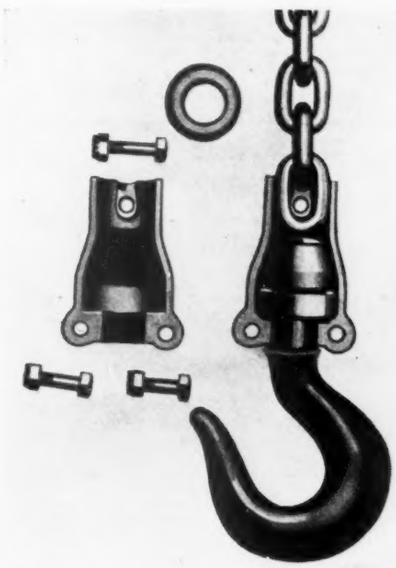
Size	D
Recommended working speed at 90 lb. air pressure	700 r.p.m.
Weight (incl. breast plate and chuck)	14 lb.
Length of feed (with feed screw)	2½ in.
Standard twist drill with drive	9/16 in.
Size reamer will drive	5/16 in.
Length overall (with breast plate and chuck)	15 in.
Distance from side to center of spindle	1½ in.
Size hose recommended	½ in.

Ball Bearing Hoisting Hook

TWISTING a chain with a heavy load is hard work and often dangerous. The ball bearing hook illustrated does away with this difficulty. The manufacturers say that it takes so little energy to move the load that it can be turned with one finger.

In construction the hook is of the indestructible type with a large strong cast steel housing enclosing the entire bearing and chain connection. The housing is split its entire length, being clamped together by three large steel pins, the top one being the chain connecting pin and the lower two acting as purely clamping bolts. This construction is necessary on account of assembling the ball bearings in the housing and also installing the hook in position.

The lower ball race rests on a shelf at the bottom of the housing. The upper race resting on top of the large capacity balls which easily accommodate any overload ever hung on the hook. The straight shank of the hook passes up through the lower part of the housing and the inside of the ball races and is retained in place by a washer and extra large nut screwed and cotter pinned to the threaded end of the shank.



Ball-bearing hoist hook

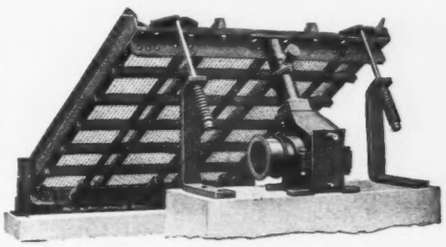
The ball bearings are thoroughly lubricated so as to insure easy frictionless action and to overcome all difficulty in positioning even the heaviest loads.

It is made by the Wright Manufacturing Co. of Lisbon, Ohio.

New Skeleton Screen

THE Sturtevant Mill Co. of Boston, Mass., have just completed the design of a new type of heavy duty "Moto-Vibro" screen of skeleton construction, built to place over a bin or hopper. This screen is simplicity itself, as all non-essentials have been omitted. Therefore its cost has been reduced to a minimum.

It is built primarily for sand and gravel, crushed rock, coal and similar substances to be screened wet, dry or damp and has a range of output from 2 in. to 10 mesh or finer.



Rugged vibrating screen for sand, gravel and stone

The vibration is rapid and intense; no load can stop it but being graduated with maximum movement at the intake to minimum at the discharge, it gives greatest action at the point of heaviest load, diminishing as the material lessens in quantity, thus giving greater opportunity to the granules nearer the size of the meshes to pass through, as it nears the bottom. All horizontal wires have vibration of equal amplitude from the extreme edges to the center. All vertical wires have equal vibration but graduated, as above explained, from top to bottom therefore the entire screen cloth at every point is equally efficient.

A 4x5-ft. screen can handle a feed of over 50 ton per hour when putting through 25 tons of ¼-in. sand. With such a load, especially when damp, violence is required to break up mats which would otherwise ride over the screen surface unscreened, and at the same time vibrating amplitude must be regulated to prevent excessive flexing of the clothing which causes wire breakage

The accessibility, simplicity, capacity and price of the "skeleton" screen has a strong appeal. It requires only 2 hp. to operate, and should have a large field of usefulness.

News of All the Industry

Incorporations

Providence Sand and Gravel Co., Greenwood, Miss., has been incorporated for $100,000.

Dolomite Limestone Products Co., Muskegon, Mich., has been incorporated for $20,000.

French Tile Concrete Construction Co., Los Angeles, Calif., has been incorporated for $50,000.

American Beauxite Co., Chattanooga, Tenn., has been incorporated by Norman B. Morrell, Chas. A. Miller, and others.

Southern Magnesite Products Co., Jacksonville, Fla., has been incorporated for $10,000 by G. T. Walker and others.

Mt. Princeton Granite Co., Denver, Colo., has been incorporated for $15,000 by W. Milne, W. Russell, and W. Yule.

West Point Tile Co., West Point, Miss., has been incorporated for $25,000 by B. W. Norris, E. M. Powell, and others.

Portland Cement Lumber Co., New York, has been incorporated under the laws of Delaware for $500,000 to $5,000,000.

Green River Rock Asphalt Co., Louisville, Ky., has been incorporated for $1000 by Harry N. Lukins, John P. Haswell, and J. V. Prewitt.

Finch & Ostrander, Albany, N. Y., has been incorporated for $5200 by J. C. and N. T. Finch and V. L. Ostrander to make artificial marble.

Bedford Mining Co., Bedford, N. Y., has been incorporated for $110,000 to operate mines and quarries. Incorporators: John Kinkel, Bedford, N. Y.

Mayfield Stone Corp., Gloversville, N. Y., has been incorporated for $25,000 by R. S. and A. Sanibal and J. A. Dunham. (Attorney, W. H. Freeman, Gloversville.)

Belmont Crushed Stone Quarries, Philadelphia, Penn., have been incorporated under the laws of Delaware for $25,000. (U. S. Corp. Co., Wilmington, Del., agent.)

Ellettsville Stone Co., Martinsville, Ind., has been incorporated for $50,000 to quarry and deal in stone and stone products. Incorporators: Karl I. Nutter, Blanch M. Nutter, and Parks A. Nutter.

Dupuis Sand and Gravel Co., Fall River, Mass., has been incorporated for $10,000. President, William Dupuis; treasurer, Ralph W. Thomas, 1025 Rock street, Fall River; and Bertha Lemay.

Stony Brook Sand and Gravel Corp., New York, has been incorporated for $85,000 by G. A. Bullock, O. Fradus, and L. M. Scott. (Attorney, H. D. Valentine, 165 Broadway, New York City.)

American Roofing Tile Co., Terre Haute, Ind., has been incorporated for $10,000 to deal in concrete products. Incorporators: Harry L. Lowe, Edna M. Lowe, Wilbur M. Marble, and Ethel Marble.

Yardville Cement Block Co., Trenton, N. J., has been incorporated to manufacture concrete products. Incorporators: John J. Falcey and Edward Boughey, of Trenton, and Carl H. Dalton, of Groveville.

Cement Products Co., Fairmont, W. Va., has been incorporated for $25,000 by A. C. Lyons, Charles F. Martin, James C. Allen, and Ernest McCoy, all of Fairmont; H. L. Ice, of Enterprise; and H. E. Starn, of Catawba.

Grafton Mica Products Co., Inc., Boston, Mass., has been incorporated for $50,000 to produce mica specialties and kindred products. David W. Moffatt, president; Frank W. Hall, Grafton, N. H., treasurer and representative.

Illinois Pulverizing Co., Utica, Ill., has been incorporated for $4000 to deal in, mine, pulverize, and quarry minerals, etc. Incorporators: George J. Gleim, George F. Locke, and F. C. E. Schneider. Correspondent: Gleim & Colwell, 503 Maloney boulevard, Ottawa, Ill.

Sand and Gravel

Peninsula Building Material Co., Menlo Park, Calif., has completed its sand, rock and gravel plant.

Concho Washed Sand Co., Oklahoma City, Okla., has increased its capital from $10,000 to $25,000.

J. C. Crowell, Charlotte, N. C., has acquired the plant and holdings of Yadkin Gravel Co., near Lilesville, N. C.

Eddyville Sand and Gravel plant, Eddyville, Iowa, is being put in shape to resume its operation, it is reported.

Kirkpatrick Sand and Cement Co., Birmingham, Ala., has just opened another sand and gravel plant at Jackson's Lake, Ala., several miles north of Montgomery.

C. W. Bartlett of the Kaw River Sand Co., 101 Railway Exchange building, Kansas City, Mo., and relatives, have purchased the interest of C. E. Todd. **William J. Stewart**, formerly assistant secretary and manager of the company, has been made secretary.

Quarries

Blosser Stone Co., near Mandale, Ohio, has resumed operation of its quarry for the season.

Diatom Co., San Miguel, Calif., recently organized, will put up a $25,000 crushing plant near Bradley, Calif.

Grande Lime and Stone Co. is about to begin the erection of a $15,000 warehouse at 341 Foothill road, Beverly Hills, Calif.

Trahan & Tetreault, Montreal, Que., manufacturers of artificial stone, have been registered by George Trahan and Joseph Tetreault.

Bayview, Idaho—Belmore & Matthews have leased the quarry of Carl and James Evans and Hilford Thomasson and will erect a plant to cost about $140,000.

Toledo Stone and Glass Sand Co., Silica, Ohio, announces that it has discontinued its Toledo office and has moved its general offices to the plant at Silica. The mailing address is R. F. D. No. 2, Sylvania, Ohio.

Quincy, Ill.—It is reported that installation of equipment, which will make this city the largest distributor of crushed rock in this section of Illinois, has been completed. This is a municipal quarry and is now running full force. The improvements include a jaw crusher, revolving screen bucket elevator, belt elevator and narrow gage railroad track.

Brownwood, Tex.—Industries here are beginning to respond to the big pay-roll of the Santa Fe Railroad Co. in the construction work on its new one and one-half miles of track to the big rock crusher on Hall mountain where a large force of men are now at work laying the permanent foundation of the crushing machinery. The company is spending an immense amount of money to get the big industry in operation at the earliest possible moment, and it is estimated that about $250,000 will be expended by the time the plant is ready to begin operations. The crushing plant of Hall Bros., which for several years furnished commercial rock for local demands, is loading rock to an outside market, and it is reported that Brownwood will thus receive additional widespread advertising.

Cement

Standard Cement Construction Co., Wilmington, Del., has increased its capital from $37,500 to $62,500.

Framerican Institute Development Corp., 6 St. Sacrament street, Montreal, Que., Canada, are exclusive Canadian agents for the Societe Anonyme des Chaux et Ciments de Lafarge et du Teil, manufacturers of lime and cement.

Yosemite Portland Cement Co., Merced, Calif., is making ready for the early installation of machinery at its new local mill on the Oakdale road, now in course of construction, and expects to have the plant ready for operation early in the fall. It will represent an investment in excess of $250,000. E. N. Baker is secretary.

International Cement Corp., 342 Madison avenue, New York, is closing negotiations for the purchase of a tract of about 2500 acres of land at Norfolk, Va., with existing cement mill, rated at 400,000 bbl. a year capacity. The new owner plans for immediate improvements to develop an output close to 1,000,000 bbl. a year. Holger Struckmann is president.

Montreal, Que., Canada.—There are immense deposits of raw material for making cement around here. There has been a rapid increase in the sale of cement in the province of Quebec during the past few years: 1921, 2,135,631 bbl.; 1922, 2,660,985 bbl.; 1923, 3,173,993 bbl. The deposit of concrete rock at the east of Montreal is said to be sufficient to supply the demand for generations to come.

Southwestern Portland Cement Co., Los Angeles, Calif., has awarded contract for a plant at Osborn, Ohio, work on which has started. The company operates plants at Victorville, Calif., and El Paso, Texas. The new plant is being designed for a capacity of 3000 bbl. per day and will cost $2,500,000. Carl Leonardt, Los Angeles, Calif., is president, and O. J. Binford, at present in Dayton, Ohio, secretary.

Lime

Henry Cowell Lime and Cement Co., San Francisco, Calif., has purchased the property lying between Eighth and Ninth streets and the Western Pacific and Southern Pacific railways, Sacramento, for the purpose of erecting a large warehouse, and the entire business of the company, now located on I street, will be moved to the new building as soon as it is ready for occupancy. W. E. L. Baughman is local manager.

Concrete Products

Golden Gate Concrete Co. has engaged in business at 55 New Montgomery street, San Francisco, Calif.

Concrete Products Co., 514 West Garfield avenue, Glendale, Calif., announce that it has opened for business. Members of the firm are, R. N. Baker and Andrew A. Braten.

Salisbury Bros., Wolfskin and Celis streets, San Fernando, Calif., is the name of a company formed by Ralph, Fred, Edwin, and Harry Salisbury, to manufacture concrete products.

W. J. Bray, Windsor, Ont., has bought out the interests of his partner, P. M. Marchand, and will operate the concrete block plant of Marchand & Bray under his own name.

Pontiac, Mich.—The experimental concrete block factory manned by jail labor, established by the county last fall, has proved so successful that another block machine is to be installed.

Burton Concrete Products Corp., Fort Worth, Tex., has been organized with L. L. Burton, president; F. H. Scott, secretary, and will erect a factory for manufacturing sewer pipe and drain tile.

Horning's Mills, Ont.—K. Strother has established a concrete brick plant here, which will have a capacity for 6000 brick a day. Horning's Mills is on the Owen Sound line of the Canadian Pacific railway.

Cement Products Co., Wilmington, Del., is reported as having made recently one of the largest shipments of reinforced concrete pipe ever made in the state of North Carolina, according to a newspaper report.

Farmer Concrete Works, St. Petersburg, Fla., will erect a new plant, the first unit of which will be 100x100 ft., and will move the buildings from the present plant at Bayboro. F. A. Farmer is president and treasurer.

O'Flaherty Cement Block Works, John R and Seven-Mile road, Detroit, Mich., has doubled its production this year, according to reports, to meet the growing demand for its product. William O'Flaherty heads the company.

Peerless Concrete Products Co., Paddock and Howard streets, Seattle, Wash., has purchased a lot at Port Angeles, Wash., and will start a manufacturing plant for making concrete products. No date has been set for starting the work.

Atlas Mineral Products Co., Allentown, Penn., manufacturer of paint pigments, etc., has authorized plans for the immediate rebuilding of the portion of its plant destroyed by fire, April 1, with loss reported at about $30,000. M. F. Wirtz is one of the heads of the company.

Cresartile Roofing Co., Inc., New Orleans, La., recently established a plant on the New Basin Canal, for the manufacture of concrete roofing tile. The report states that the first few months of operation were so successful that the company increased its capital from $15,000 to $50,000 to take care of its expansion.

Waukegan Cement Works, Waukegan, Ill., is a new firm there, it was recently announced at the Chamber of Commerce. J. H. Irey, of Muscatine,

Iowa, is the owner. He has located in the Manufacturers' Terminal and will be ready for business by the last of the month. Fifteen men will be employed at the start. The products will be in cement.

National Concrete Manufacturing Co., New York, has arranged to erect and operate a plant, to cost $50,000, in Cumberland, Md., it is reported. The company claims to have 94 plants in operation in chief cities of the country and to have a daily capacity for 1,000,000 concrete building blocks.

Ponca City, Okla.—The manufacture of concrete brick promises to become a leading industry here, it is reported. Such an industry is regarded favorably because, with the exception of the cement itself, all the ingredients are local raw materials. Concrete brick manufacture has become an important industry in the East, according to the report, and many of the largest new structures in that section of the country are being built of this type. The conclusion is that there is no question as to the merit of the product, which can be manufactured here easily in competition with other types of building brick, it is stated.

Gypsum

Universal Gypsum Co., Chicago, Ill., has opened a sales office at 507 Railway Exchange building, Kansas City, Mo., with E. H. Fapp in charge.

Silica Sand

White Bluffs, Wyo.—It is reported that Harry J. Neeley of Spokane, and E. H. MacDonald of St. Paul, geologist for the Northern Pacific, visited here recently to investigate the glass sand deposits reported to be in this locality, with the idea of interesting manufacturing concerns should the analysis show sand in paying quantities.

Talc

American Mineral Co. has removed its general offices from New York City to Burlington, Vt., P. O. Box 644.

Eastern Magnesia Talc Co., Burlington, Vt., has been formed through the merger of the Eastern Talc Co. of Boston, Mass., and the Magnesia Talc Co. of Waterbury, Vt. All communications should be addressed to the general offices at Burlington.

Potash

Alumite Potash Co. of America, Martinez, Calif., is planning the erection of a new plant for the production of commercial potash. The first unit will have a capacity for about 25 tons a day to be subsequently increased with additional units to about 100 tons a day. It will cost approximately $40,000.

Asbestos

Panhandle Asbestos Co., Lewiston, Idaho, has tentative plans for the construction of a local mill for the production of asbestos products. The local Chamber of Commerce is reported as interested in the project.

Magnesite

Cedarstone Magnesite Products Co. of California, 7205 Washington boulevard, Los Angeles, Calif., is a company formed by William D. Venters, L. V. Venters, and William M. Hamlin, Jr.

Rock Asphalt

Hartselle, Ala.—A newspaper clipping states that asphalt rock, which, for a long time, has been known to exist here in large quantities, received a boost from an expert in road building material recently. The report reads: "There is a wealth wrapped up in the asphalt rock here, and it undoubtedly will be developed at no distant day. You people have a gold mine and don't know it," the expert said when shown the quarry and a sample of the rock. The rock is almost jet black, and when heat is applied to it, the asphalt runs out leaving white sand. In a small way it has been demonstrated that this product makes a good road or street, having been tried out on the streets here, and so far has held the heavy traffic over it.

Trade Literature

Thew Shovel Co., Lorain, Ohio, has issued a folder illustrating and describing briefly the gasoline shovels of its manufacture.

Baltimore Co., Baltimore, Md. Two booklets, one on wooden tanks and the other on steel towers of this company's manufacture.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn. Booklet on treated and untreated fabrics and papers for insulating purposes. Tables of specifications are included.

Hendrick Manufacturing Co., Carbondale, Penn., is distributing to its customers and those interested, a description of the production of its perforated metalware which has been reprinted from "The Iron Age."

Variety Iron and Steel Works Co., 1277 E. 40th street, Cleveland, Ohio, has recently issued Catalog 25, illustrated herewith, giving information on the design and application of belt conveying machinery and accessories.

Catalogue 25 recently issued by the Variety Iron and Steel Works Co.

McMyler-Interstate Co., Cleveland, Ohio. Bulletin 61 describing the company's No. 2 steam shovel convertible to locomotive crane. A number of half-tones and linecuts are given, and a working-limit diagram is included. The machine includes as standard equipment, double-power drums and a self-locking worm-driven boom hoist.

Morgan Engineering Co., Alliance, Ohio, manufacturer of heavy rolling mill equipment, electric traveling cranes, and locomotive rebuilding, has issued Bulletin 27 describing and illustrating the Weston direct-drive gyratory crusher originally developed by W. S. Weston, mechanical and electrical engineer, at the granite crushing plant of Weston & Brooker. A table of dimensions and capacities is given and a sectional lay-out of the crusher is illustrated with the parts numbered and named.

Acme Road Machinery Co., Inc., Frankfort, N. Y., has issued Catalog 12 describing its products. This is a comprehensive book of 98 pages divided into groups, as follows: Motor roller, air-pressure scarifier, tandem motor roller; steam roller, steam-pressure scarifier; portable and stationary crushers, elevators and screens, gravel screeners, bins, etc.; "Tom Thumb" patrol, junior and senior grades, light and heavy traction graders, scarifiers and scarifier attachments; wagons, sprinklers, oil distributors, concrete mixers, air compressors, drills, and miscellaneous equipment. The catalog is well prepared, profusely illustrated, and carries an index for ready reference.

Manufacturers

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., announces that it has opened a down-town office at 1202 Keenan building, Seventh and Liberty avenues.

Colwell & McMullin, Boston, Mass., New England agents for Stephens-Adamson Manufacturing Co., Conveyors Corp. of America, and American Engineering Co. (hoist department), announce the removal of their offices from 79 Milk street to larger quarters in the Park Square building.

Bucyrus Co., South Milwaukee, Wis., announced on May 8, 1924, the following promotions: G. A. Morison, secretary and sales manager, was appointed second vice-president in charge of sales, in addition to his title of secretary; D. P. Eells, treasurer and manager of foreign and export department, was appointed second vice-president in charge of foreign and export department, in addition to his title of treasurer; William Bager, chief engineer, was appointed second vice-president in charge of engineering.

Crocker-Wheeler Co., Ampere, N. J., held its annual meeting May 14. The following officers were re-elected: President, Edmund Lang; vice-president, Arthur L. Doremus; secretary, Herbert C. Petty; treasurer, Theodore S. Fuller, and assistant secretary and assistant treasurer, George W. Bower. The following directors were re-elected: Edward W. Brown, Arthur L. Doremus, Hampton D. Ewing, Ernest B. Humpstone, Frank H. Jones, Edmund Lang and Michael I. Pupin. Theodore S. Fuller and Herbert C. Petty were added to the board.

Link-Belt Co., Chicago, Ill., has sent out an item regarding its sales school, part of which is given below: "During the course of a year any large organization finds it necessary to add new men to the sales force. These new men, regardless of their previous experience or training, must be coached in company policies and standards of practice. They must be educated as to machinery design and construction before success as a salesman can be expected from any one of them. Realizing that this education and training is expensive and that at best it can be accomplished only over quite a period of time, the Link-Belt Co. has adopted the policy of holding annual sales schools. The most recent of these schools was held at the Link-Belt Indianapolis factory, May 5 to 8 inclusive. The salesmen came from the Boston, Philadelphia, Toronto, Pittsburgh, Cleveland, Detroit, Chicago, Seattle and Indianapolis offices."

Personals

Fred J. Mershon, for many years export sales manager of the Industrial Works, Bay City, Mich., is now in charge of the company's Detroit branch office in the Book building.

Roger Birdsell, formerly connected with the Bureau of Standards, Washington, D. C., is now associated with the Racine Radiator Co., Racine, Wis., manufacturer of "Perfex" radiators and cooling systems, in the capacity of sales engineer.

N. E. Otterson, formerly of the New York district sales office of the Osgood Co., Marion, Ohio, has been transferred to the Chicago office of the company as sales manager in charge of the Chicago district. He succeeds C. A. Phillips, who resigned to go into business for himself.

Hardy A. Wadsworth, for a number of years on the staff of the Portland Cement Association at its headquarters in Los Angeles, Calif., has taken over the concrete products work of the association in the Southern California and Arizona district. His new field covers the promotion of all kinds of concrete work except paving.

J. L. Levay has joined the sales force of the Browning Co. of Cleveland, Ohio, and will have his headquarters at the company's Chicago office, 664 Peoples Gas building. **H. K. Robinson** has also joined the organization and will represent the company in the St. Louis territory with headquarters at the Federal Reserve Bank building, St. Louis, Mo.

C. Lindley Wood, of the recently organized Florida Diatomite Co., Clermont, Fla., is the son of Charles Wood, M. Inst. C. E., a prominent English engineer and the inventor of slag wool, or so-called mineral wool. The father also invented other uses for slag, including the manufacture of bricks and its use for concrete aggregate. He built the first cast-in-place concrete houses in England about the year 1869, using slag aggregate. These buildings are as good as ever.

Obituary

Norman I. (Pooch) Gaines, traveling salesman for the Marquette Cement Co., died at his home at Cape Girardeau, Mo., recently, following a short illness.

Worthington Pump and Machinery Corporation

115 Broadway, New York

In order to concentrate our manufacturing facilities as much as possible, we beg to announce to our customers the closing of our Power & Mining Works, at Cudahy, Wisconsin, on April 30, 1924.

All lines of product will be transferred to our other works excepting only the Mining, Crushing, Cement and Creosoting Machinery. These lines having little in common with our other regular manufactured product, it has been deemed advisable in closing these works to discontinue their manufacture by us.

To insure the many users of our equipment of this character a continuance of proper service, we have made arrangements with The Allis - Chalmers Manufacturing Company of Milwaukee, Wisconsin, for that company to take over all of our records, patents, drawings, patterns, jigs and fixtures, and manufactured stock on hand, in fact, everything pertaining to these particular lines essential for the supplying of identical equipment heretofore made by us and repair parts for same.

We wish to take this opportunity of thanking our customers for their cordial support in the past and to solicit for The Allis-Chalmers Manufacturing Company a continuance of the patronage bestowed upon us, feeling that in the arrangements made we have acted definitely in the interests of our customers in transferring this business to a manufacturer of such recognized high standing in these lines.

WORTHINGTON PUMP AND MACHINERY CORPORATION

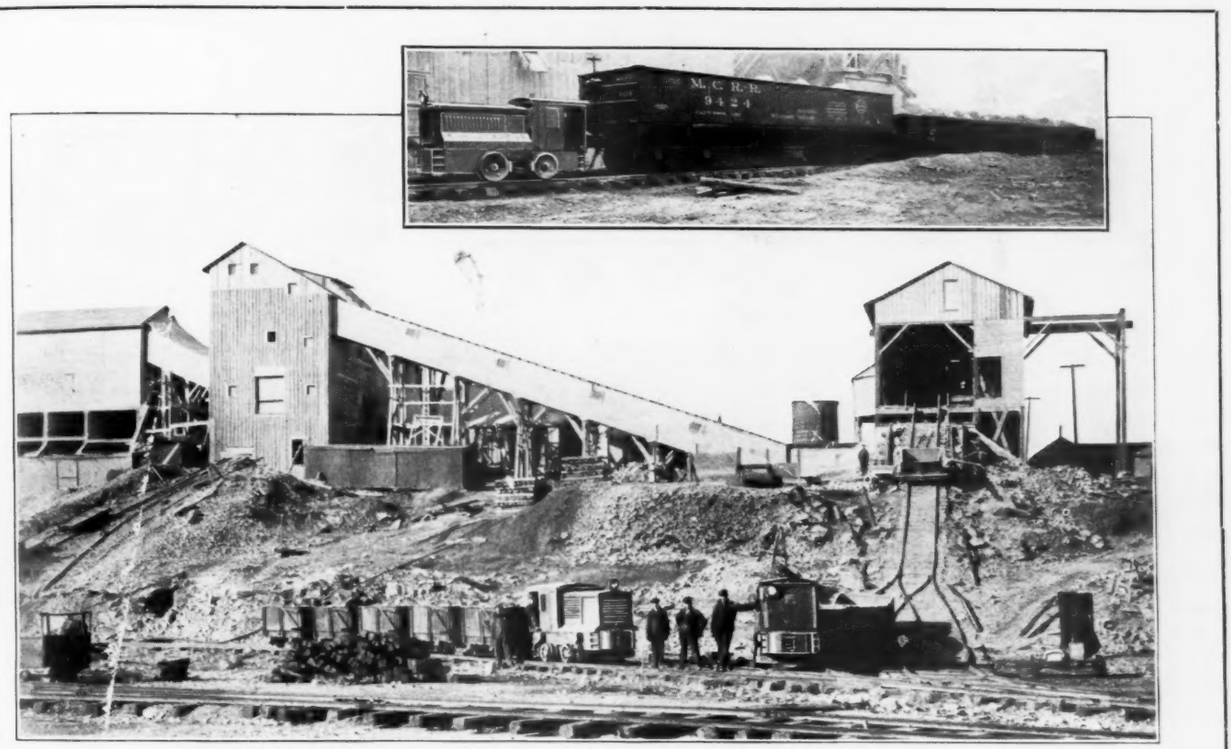
May 1, 1924.

WORTHINGTON

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Chicago, May 31, 1924 FOUNDED 1902 Volume XXVII, No. 11



Plymouth Locomotives, Equipment of Hagersville Quarries, Ltd., Hagersville, Ontario

Plymouth Gasoline Locomotives Displace Steam

Mr. F. B. Marble, President of Hagersville Quarries, Ltd., writes:

"We are using two Model BL 7 ton Plymouth Locomotives in the pit, each handling from 5 to 10 cars.

"We use a Model DL 7 ton for spotting and switching railroad cars at the loading dock where there is about a 1% grade. With all three machines working full time, we are using 21 gallons of gas per day.

"Our Plymouth Locomotives do very good work and have convinced one of the old time steam dinkey advocates that they are more economical and much more convenient than steam and do the work perfectly satisfactorily."

Write for Catalog and Bulletins "C" and "F."

The Fate-Root-Heath Co., 210 Riggs Ave., Plymouth, Ohio.

PLYMOUTH
Gasoline Locomotives

MEMBER AUDIT BUREAU OF CIRCULATIONS PUBLISHED BY THE TRADEPRESS PUBLISHING CORPORATION, Inc. MEMBER ASSOCIATED BUSINESS PAPERS

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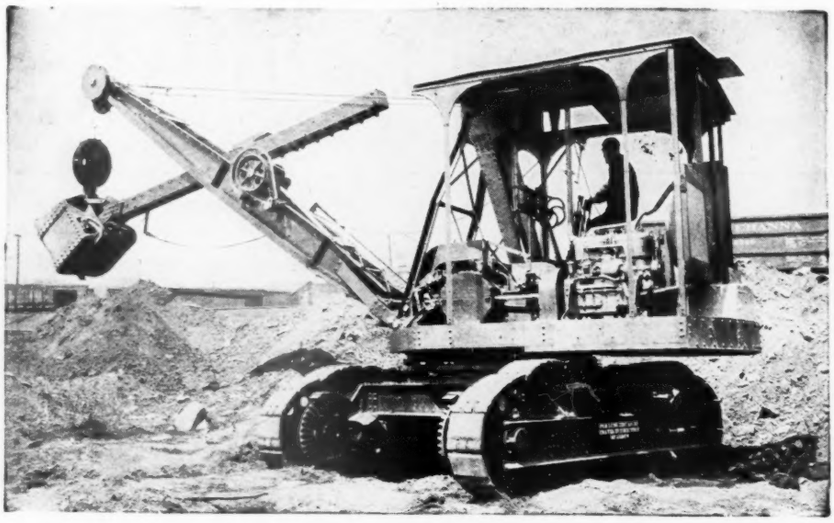

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EXCELLENCE seeks like company. This, we like to believe, is the fundamental reason why so many of the modern and efficient plants in the rock products industry have purchased O-S Dependable Shovels and Cranes. Wherever installed it has made an enviable record and the more efficient the plant the more enviable the record.

O-S shovels and cranes are made only of the highest grade materials. Expert workmanship — the best money can buy — goes into it. Behind it all is years of experience in shovel and crane building. The result is a product that is always the last word in efficiency and economy.

Equipped with CLIMAX TRUSTWORTHY ENGINES

Let us know your requirements. We will be glad to give you any information. No obligation on your part.

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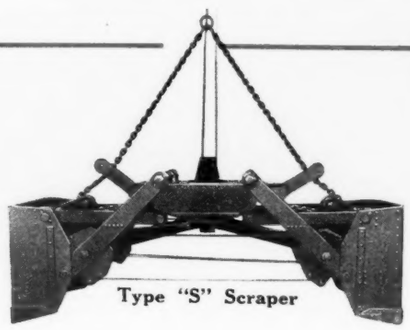

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